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# USSR Report

CHEMISTRY

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USSR REPORT  
CHEMISTRY

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MECHANOCHEMICAL HYDROGENATION OF GRAPHITE BY HYDROGEN

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 60, No 3, Mar 86  
(manuscript received 24 Apr 84) pp 579-584

[Article by P. Yu. Butyagin, I. V. Berestetskaya, I. V. Kolbanov and  
I. K. Pavlychev, Institute of Chemical Physics, USSR Academy of Sciences,  
Moscow]

[Abstract] Graphite was ground in hydrogen or helium in steel or quartz microgrinders connected with measurement and vacuum systems. Expenditure of hydrogen during hydrogenation was determined by the pressure drop in the grinder and depth of hydrogenation was determined by hydrogen expenditure. The mechanical treatment of the graphite powder causes its mechanochemical hydrogenation. Energy yield of the reaction increases with an increase of energy intensity ( $I=0.5-80$  W/g), temperature (80-800 K) and pressure of the hydrogen ( $1-2 \cdot 10^4$  gPa) and is 0.12 moles  $H_2$ /MJ when  $p(H_2)=2 \cdot 10^4$  gPa and  $I=80$  W/g. The yield decreases when the depth of hydrogenation is more than 8-10 percent; the absorption of hydrogen is accompanied by liberation of gaseous methane. Figures 4; references 10: 9 Russian; 1 Western.

2791/12947  
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UDC 66.02.022.34

EFFECTS OF MODIFYING ADDITIVES ON OPERATIONAL CHARACTERISTICS OF AEROSOL-FORMING POWDERS

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 2, Mar-Apr 86 (manuscript received 23 Oct 85) pp 44-46

[Article by D. F. Datsenko, I. I. Chesha, T. G. Verbetskaya and V. V. Adamenko, Kiev University]

[Abstract] An assessment was conducted on various additives designed to promote hygroscopic properties of aerosol-forming powders used for dispersing various mixtures. Analysis of the physical and chemical effects of various additives demonstrated that addition of 1.5-2% magnesium stearate or stearic acid ensures maximal protection from moisture absorption. In addition, silica powder was ascertained to be the best agent for preventing caking in a concentration of 0.5% or less. Figures 2; references 2 (Russian).

12172/12947  
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ESTABLISHING COMPOSITION OF COMPLEX MIXTURES OF ORGANIC SUBSTANCES ACCORDING TO GAS CHROMATOGRAPHIC DATA USING COMPUTERS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 10, Oct 85  
(manuscript received 19 Jul 84) pp 1733-1760

[Article by D. N. Grigoryeva and R. V. Golovnya, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] This is a review of the use of computers to assist in the identification of the components of complex mixtures of organic compounds by gas chromatography (GC). Identification involves the search for functional relationships between chromatographic retention and the physicochemical and structural properties of compounds being analyzed. Linear equations for the dependence of retention on the number of carbon atoms in a homologous series of organic compounds exhibit excessive deviations from theory, so that their use for GC identification is limited. Correlation of retention with structural increments, nearest neighboring atom approaches, use of physicochemical characteristics and topological analyses all have various difficulties, making them unsuitable for chromatographic identification of unknown components. The reason that these various schemes for calculating retention parameters are not successful is connected with the hyperbolic, rather than linear, relationship between the logarithm of specific retention volume or the differential molar free energy of adsorption and chain length in many types of compounds. The authors have previously described a complex equation which successfully calculates retention parameters from chain length for 74 series of monofunctional compounds, with 7 other series giving borderline accuracy. Successful algorithms for identification in complex mixtures rely on the use of multiple GC stationary phases, division of components into identified and conditionally identified substances and hyperbolic equations for correlating retention with structure. Figures 2; references 204: 70 Russian, 2 Hungarian, 2 Polish, 130 Western.

12126/12947  
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## ENZYME METHODS FOR DETERMINING LEAD USING ALKALINE PHOSPHATASE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 10, Oct 85  
(manuscript received 1 Nov 84) pp 1810-1814

[Article by T. N. Shekhovtsova, V. V. Kucheryayeva and I. F. Dolmanova,  
Moscow State University imeni M. V. Lomonsov]

[Abstract] The possibility of using alkaline phosphatase for determining trace amounts of magnesium, barium, calcium, strontium, cadmium and lead ions was examined. Two types of substrates were used. With p-nitrophenylphosphate the reaction could be followed by measuring absorbance at 400 nm. When substrates whose hydrolysis products are not colored, i.e., inorganic phosphate, phosphoethanol, glucose-6-phosphate or 1-glycerophosphate, were used, the reaction was stopped at three minutes with ammonium molybdate, then the products were extracted with isobutanol and reduced with tin (II) chloride to molybdenum blue, which was arrayed at 720 nm. The enzyme exhibited greatest activity in reactions with p-nitrophenylphosphate. Experiments were conducted in pH 9.8, 0.05 M Tris buffer. Adding the substrate last was found to be most effective, as was an enzyme concentration of  $4.0 \times 10^{-7}$  M and p-nitrophenylphosphate concentration of  $3.0 \times 10^{-4}$  M. The initial reaction rate depended on the time of incubation of the enzyme with the metal ion being studied, with five minutes being optimal. Inhibitory effects were observed for magnesium, calcium and barium ions which were proportional to concentration. At concentrations of 1-100 mcg/ml magnesium ions activated enzyme activity. Strontium ions did not affect the enzyme reaction rate, while aluminum ions were inhibitory at  $10^{-3}$ -1 mcg/ml and activating at 1-10 mcg/ml. Cadmium and lead exhibited inhibitory effects from  $10^{-3}$  to 10 mcg/ml, with the lead effect linear and the cadmium effect showing a maximum at 1 mcg/ml. These effects can be used to measure ion concentration. The sensitivity of the method to lead concentration is equal to that of the most sensitive atomic fluorescence procedures. Magnesium and cadmium ions are the main interferences expected. Figures 3; references 7: 1 Russian, 6 Western.

12126/12947  
CSO: 1841/233

DETERMINATION OF FREON-12 IN ATMOSPHERIC AIR USING DIODE LASER SPECTROSCOPY

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 10, Oct 85  
(manuscript received 14 Jun 84) pp 1903-1906

[Article by I. I. Zasavitskiy, Yu. V. Kosichkin, A. I. Nadezhdinskiy,  
Ye. V. Stepanov, A. Yu. Tishchenko, V. U. Khattatov and A. P. Shotov,  
Institute of General Physics, USSR Academy of Sciences, Moscow]

[Abstract] A method was developed for determining the concentration of freon-12 in atmospheric air using diode laser spectroscopy. This determination is difficult, due to the low concentration involved, about  $10^{-8}\%$ , and the partially overlapping lines of the freon spectrum. Experiments were conducted in the  $915-930\text{ cm}^{-1}$  region of the spectrum, using the P- and R-bands, a temperature of  $150^\circ\text{K}$ , electronic suppression of optical and electronic interference, correlation processing of spectral sections and a strobe integrator. The method had a detection limit of  $10^{-6}$  -  $10^{-7}\%$  freon-12, which was lowered to  $10^{-8}\%$  by using cryogenic preconcentration. The method was validated and used to measure the level of freon-12 in laboratory and outside air. The results obtained were  $3 \times 10^{-7}\%$  and  $3 \times 10^{-8}\%$ , respectively. Figures 3; references 8: 6 Russian, 2 Western.

12126/12947  
CSO: 1841/233

UDC 541.49:546.722

OUTER SPHERICAL TRIS-DIAMINE COMPLEXES OF IRON (II) AND THEIR ANTIMICROBIAL ACTIVITY

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 2, Feb 86 (manuscript received 25 Jul 85) pp 45-48

[Article by V. V. Skopenko, corresponding member UkSSR, G. K. Paliy, Ye. F. Makats and N. N. Gerasimchuk, Kiev State University imeni T. G. Shevchenko]

[Abstract] Tris-diamine (2.2-dipy or 1.10-phen) complexes of iron (II) with non-linear acidoligands of the methanide and amide types were studied by infra-red and electron spectroscopy methods. Outer spherical coordination and charge transfer from the extraspherical non-linear acidoligands to the central ion were determined. Antimicrobial activity of the compounds produced and of some state-registered compounds were studied on cultures of Staphylococcus aureus 209, Escherichia coli M-17 and yeast-like fungi of the Candida genus. Bactericidal activity by the compounds studied was evident in all cases. The degree of antimicrobial effect depended upon the nature of the extra-spherical anion. References 9: 5 Russian; 4 Western.

2791/12947

CSO: 1841/502

## CATALYSIS

### CATALYSIS WITH HETEROPOLY-COMPOUNDS

Moscow KATALIZ GETEROPOLISOYEDINENIYAMI (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA "KHIMIYA") in Russian No 12, Dec 85 (signed to press 16 Oct 85) p 2

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#### Annotation

This brochure is devoted to a new prospective direction in catalysis-- application of heteropoly-compounds as catalysts of various chemical reactions. The unique properties of heteropoly-compounds and their uses in investigating fundamental problems of catalysis and in developing effective catalysts are considered.

The publication is addressed to lecturers, instructors, students at national universities, and all those interested in the theoretical and applied problems of catalysis.

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/12947

CSO: 1841/342-P

## BRIEFS

NEW INEXPENSIVE CATALYSTS USED--The classical catalysts are platinum, palladium, or their compounds. An inherent shortcoming is their high cost. A discovery by Soviet scientists is making it possible for us to turn away from these expensive substances in a number of cases. The new catalysts are amenable to "control"--their properties are easily regulated. The USSR State Committee for Inventions and Discoveries awarded a certificate for the discovery to the following associates of the USSR Academy of Sciences Institute of Organic Chemistry: Academician Kh. Minachev, Dr of Chemical Sciences V. Garanin, and candidates of chemical sciences V. Kharlamov and T. Isakova. The progress of chemistry would be impossible without constant updating of the assortment of catalysts and catalytic systems. Chemists confirm this: "Catalysis is a great future chemical industry." Here is the essence of the discovery. A very widespread type of reaction is the reaction of joining hydrogen (hydrogenation) to unsaturated organic compounds. The catalysts here are precious metals: platinum, palladium. The authors of the discovery tore down a primary assumption of chemists--they proved that ions, for example sodium and potassium, which are part of widespread natural compounds--crystal aluminosilicates--can also be a kind of catalyst for hydrogenation. The new catalysts are finding application in processes of petroleum refining, producing caprolactum, and purifying gasoline. In addition, these catalysts are considerably more resistant to the effect of harmful additives, they do not "become polluted," as the chemists say, and consequently they can be used for a longer time. [Text] [Moscow ZNANIYE-SILA in Russian No 12, Dec 85 p 8] [COPYRIGHT: "Znaniye-sila", 1985] 12255/12947

CSO: 1841/431

## BRIEFS

ENZYME-ELECTRODE CATALYSIS DEVELOPED--On 19 December 1985, the USSR State Committee for Inventions and Discoveries registered a discovery made by the following associates of the USSR Academy of Sciences Institute of Electrochemistry imeni A. N. Frumkin and Moscow State University: USSR Academy of Sciences Corresponding Members I. Berezin, Candidate of Chemical Sciences V. Bogdanovskaya, doctors of chemical sciences S. Varfolomeyev and M. Tarasevich, and Candidate of Chemical Sciences A. Yaropolov. Chemistry and electrochemistry are familiar with very different types of catalysts. Work carried out by Moscow chemists has added to these yet another specific type. It turned out that enzymes (proteins which carry out the transformation of various substances in living organisms), when attached to electrodes, are capable of accelerating chemical reactions in electrolytes by millions of times. The discovery of the phenomenon of bioelectrocatalysis has not only made radical changes to important areas of biochemistry and electrochemistry, but also has helped to create a number of new techniques and instruments. In particular, analyzing devices have been created which make it possible to take rapid and reliable recordings of specific states in biological liquids with complex compositions during medical diagnosis. Enzymes attached to electrodes can be used to obtain compounds, including physiologically active compounds, which are impossible to obtain by other methods. In addition, bioelectrocatalysis is opening up the possibility of creating new, highly effective energy converters. [Text] [Article by I. Novodvorskiy] [Moscow IZVESTIYA in Russian 20 Dec 85 p 2] 12255 /12947

CSO: 1841/431

UDC 541.128.12:541.145:542.943.7:346.212:547.953.2:953.2:546.733:547.822.896-44

COBALT ION-CATALYZED OXIDATIVE REACTIONS IN PHOTOCATALYTIC SYSTEM PREPARED FROM LECITHIN VESICLES

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86 (manuscript received 29 Jan 85) pp 109-116

[Article by I. M. Tsvetkov, S. V. Lyamar, V. N. Parmon and K. I. Zamarayev, Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] Evaluation was conducted on the oxidative reactions in a photocatalytic system consisting of the oxidizing agent ruthenium trisbipyridyl complex ( $\text{Ru}(\text{bpy})_3^{3+}$ ; I) as the photocatalyst and cetyl viologen (II), incorporated into the membrane of the lecithin vesicle, as the reducing agent. Illumination at 455 nm resulted in electron transfer from I to the hydrophobic carrier II and thence across the lipid membrane to the acceptor  $\text{Fe}(\text{CN})_6^{3-}$ . Addition of Co ions to the system resulted in oxidation of organic compounds represented by, in all probability, lecithin with the production of  $\text{CO}_2$ . However, since  $\text{O}_2$  was not produced in the system containing I within the vesicles or without, it appears that photocatalytic oxidation of water did not occur. The absence of the latter reaction was apparently due to the more rapid oxidation of lecithin. In the absence of Co ions  $\text{CO}_2$  production did not take place, substantiating the catalytic role of these ions. It appears however, that photocatalytic oxidation of water in this system may be attained with the use of a catalyst more selective than Co ions, or lipids more refractory to oxidation than lecithin. Figures 2; references 22: 13 Russian, 9 Western.

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CSO: 1841/527

UDC 541.128.3:542.941.8:546.98-44:546.11:547.263

EFFECTS OF HYDROGEN ON DEHYDROGENATION OF ISOPROPANOL OVER MEMBRANOUS  
PALLADIUM CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86  
(manuscript received 29 Apr 85) pp 138-141

[Article by N. N. Mikhalenko, Ye. V. Khrapova and V. M. Gryaznov, People's  
Friendship University imeni Patrice Lumumba, Moscow]

[Abstract] The effects of hydrogen on the conversion of isopropanol to  
acetone over a palladium foil,  $10^{-4}$  m thick, at 429 and 431 K were evaluated  
in relation to time and the  $P_{H_2}/P_{H_2 \text{ isoprop.}}$  ratio in  $N_2$  carrier. The graphical

data demonstrated that the rate of dehydrogenation was dependent on the  $P_{H_2}$ ,  
with maximal conversion evident at a ratio of  $P_{H_2}/P_{H_2 \text{ isoprop.}}$  of ca. 3.5.

Hydrogen was adsorbed to the palladium foil at the temperatures of dehydro-  
genation, with the periodicity in conversion attributed to the fluctuations  
in the concentration of hydrogen at the surface of the catalyst and in the  
reactive boundary layer. Figures 4; references 5 (Russian).

12172/12947  
CSO: 1841/527

UDC 541.128.13:542.943:541.183:533.15:546.21:546.57:547.21

ROLE OF SILVER FOIL-DIFFUSIBLE OXYGEN IN HETEROGENEOUS OXIDATION

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86  
(manuscript received 20 Jun 85) pp 142-146

[Article by V. M. Gryaznov, V. I. Vedernikov and S. G. Gulyanova, People's  
Friendship University imeni Patrice Lumumba, Moscow]

[Abstract] An analysis was conducted on the participation of various forms of oxygen that diffuse through a silver foil catalyst  $10^{-4}$  m thick in oxidation of alcohols, hydrocarbons and ammonia. Comparative data for oxygen permeability at 673 K and formation of  $\text{CO}_2$  and CO under various conditions of temperature and pressure indicated that the limiting stage of oxygen diffusion across the silver membrane consists of processes at the egress side of the membrane in which atomic oxygen particles are involved. That side of the membrane, then, is saturated with oxygen atoms capable of recombination to yield oxygen molecules or react with substrates in contact with the silver surface. The reaction of ethanol, methanol, propylene, ethylene or ammonia with the diffusible oxygen reduces the energy of activation of oxygen permeability from in vacuo values of 82-96 kJ/g·atom to 54-67 kJ/g·atom. This fact may indicate that the substrates interact with oxygen particles that preceded the diffusion-limiting stage, implicating  $\text{O}^{-2}$  as the species responsible for oxidation. Figures 4; references 7 (Russian).

12172/12947  
CSO: 1841/527

UDC 542.943.7:541.128.36:541.183:546.92'831'655'623:547.21

EFFECTS OF Ce, Zr AND La ON STATE OF Pt AND ACTIVITY OF Pt/Al CATALYSTS IN COMPLETE OXIDATION OF HYDROCARBONS

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86 (manuscript received 11 Feb 85) pp 162-166

[Article by V. A. Drozdov, P. G. Tsyulnikov, V. V. Popovskiy, A. A. Davydov and E. M. Moroz, Institute of Catalysts, Siberian Department of USSR Academy of Sciences, Novosibirsk]

[Abstract] Spectroscopic studies were conducted to determine the effects of Ce, Zr and La on the state of Pt in Pt/Al ( $\gamma$ -Al<sub>2</sub>O<sub>3</sub>) catalysts and the consequences for oxidation of methane and butane. The data provided unambiguous indication that in the bimetallic catalysts (Pt-Zr/Al, Pt-La/Al, Pt-Ce/Al) Pt was stabilized in the oxidized state, thus facilitating oxygen adsorption, with the effectiveness of the added metals ranked as follows Zr < La < Ce. The bimetallic catalysts were thus characterized by higher specific catalytic activities in the oxidation of methane and methane than that exhibited by the Pt/Al catalysts. The apparent energies of activation for complete oxidation of methane for Pt/Al, Pt-Zr/Al, Pt-La/Al and Pt-Ce/Al were, respectively 129, 134, 117, and 105 kJ/mole; the corresponding energies of activation for the oxidation of butane were 75, 75, 69 and 87 kJ/mole. Figures 3; references 8: 6 Russian, 2 Western.

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CSO: 1841/527

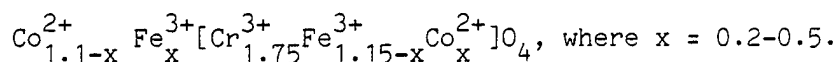
UDC 541.128.13:542.943.7:546.262-31:546.02:543.422:546.76'73'72-31

STRUCTURE AND ACTIVITY OF Fe-Co-Cr CATALYSTS IN COMPLETE OXIDATION OF  
HYDROCARBONS

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86  
(manuscript received 13 Mar 85) pp 194-200

[Article by M. D. Shibanova, B. M. Kadenatsi, Yu. V. Maksimov, A. V. Golubyev,  
A. I. Matveyev and I. P. Suzdalev, Institute of Chemical Physics, USSR  
Academy of Sciences, Moscow; Mordovian State University, Saransk]

[Abstract] Transition metal oxides were employed as catalysts for complete oxidation of hydrocarbons in order to assess the effects of composition on catalytic efficiency and its relation to structural parameters of the catalyst derived from Mossbauer spectroscopy. Analysis of several Fe-Co-Cr systems in the oxidation of gasoline demonstrated that systems with low Co concentrations possessed low-activity and consisted of binary solid solutions with corundum structure ( $\text{Fe}_{2-y}\text{Cr}_y\text{Co}_3$ ). Raising the Co concentration to > 10 at% resulted in the formation of tripple spinels ( $\text{Co}_x\text{Cr}_y\text{Fe}_{3-x-y}\text{O}_4$ ) with considerably greater catalytic activity. Highest stability and catalytic activity was exhibited by a mixed spinel of the following composition:



Figures 2; references 22: 11 Russian, 11 Western.

12172/12947  
CSO: 1841/527

UDC (546.74'654-44+547.412.722-126):541.128'123.52:546.11

ACTIVITY OF HYDROPHOBIC  $\text{LaNi}_5$ -POLYTETRAFLUOROETHYLENE ( $\text{LaNi-PFE}$ ) CATALYST  
IN HYDROGEN ISOTOPE EXCHANGE<sup>5</sup> WITH WATER

Moscow KINETIKA I KATALIZ in Russian Vol 27, No 1, Jan-Feb 86  
(manuscript received 7 Feb 85) pp 224-227

[Article by B. M. Andreyev, E. P. Magomedbekov, A. A. Firer and I. Yu.  
Nagayev, Moscow Institute of Chemical Technology imeni D. I. Mendeleyev]

[Abstract] The hydrophobic  $\text{LaNi-PFE}$  catalyst was prepared by mixing  $\text{LaNi}_5$  powder with 60% PFE emulsion in water, with the emulsion dispersed into 1-5 mm granules, activated with  $\text{H}_2$  at ca. 520 K, and tested for efficiency in deuterium and tritium exchange with water. Kinetic studies in the temperature interval of 313-393 K under pressures of  $(1.3-10.1) \times 10^4$  Pa demonstrated that the reactions followed first order kinetics, an indication that diffusion was not a limiting factor. Additional confirmation for the fact that the reactions were not diffusion-limited was provided by the observation that granule size had virtually no effect on the rate of isotope exchange. The rate of exchange was, however, limited by the dissociation of hydrogen on the surface of the catalyst, as suggested by the fact that the reaction was 0.5 order with respect to hydrogen pressure. The calculated energies of activation were on the order of 36 kJ/mole. Comparison of  $\text{LaNi-PFE}$  activity with that of conventional catalysts suggest that it may find application in industrial separation of hydrogen isotopes. Figures 2; references 22: 9 Russian, 13 Western.

12172/12947  
CSO: 1841/527

## EFFECT OF NATURE OF CARRIER ON PROPERTIES OF TECHNETIUM CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 86 (manuscript received 17 Sep 84) pp 288-294

[Article by G. N. Pirogova, N. M. Prokhorets, R. I. Korosteleva and Yu. V. Voronin, Institute of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] The interaction of deposited Tc with carriers  $\text{SiO}_2$ ,  $\gamma\text{-Al}_2\text{O}_3$ ,  $\text{MgO}$ ,  $\text{ZrO}_2$ ,  $\text{TiO}_2$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{Nd}_2\text{O}_3$ ,  $\text{Er}_2\text{O}_3$ ,  $\text{Yb}_2\text{O}_3$ ,  $\text{Pr}_4\text{O}_7$ ,  $\text{BaSO}_4$  and carbon was investigated in the dehydrogenation of isopropanol (I) and cyclohexane (II). Tc concentrations of 0.7-5.2% at 200°C for (I) and 0.8-5.3% at 400°C for (II) were studied. The catalytic activity was greatest for Tc/MgO and Tc/oxides of rare earth elements and least for Tc/ $\text{SiO}_2$ , Tc/C and Tc/ $\text{TiO}_2$ . Tc displays catalytic activity on all carriers except  $\text{BaSO}_4$  in the dehydrogenation of alcohols and cyclic hydrocarbons. Selectivity of 100% was observed for all catalysts in the dehydrogenation. Catalysts from one carrier source, such as  $\gamma\text{-Al}_2\text{O}_3$ , preserve the uniformity of their specific catalytic activity independent of the content of the deposited metal. From the study of surface conditions of Tc, thermally-programmed reductions of the system  $\text{NH}_4\text{TcO}_4/\text{carrier}$  showed that  $\text{SiO}_2$  acts as a dispersion agent, but  $\text{Y}_2\text{O}_3$  and  $\gamma\text{-Al}_2\text{O}_3$  are not only dispersion agents but also they interact with  $\text{NH}_4\text{TcO}_4$ . Spectra of adsorbed CO on catalysts Tc/ $\gamma\text{-Al}_2\text{O}_3$ , Tc/ $\text{Y}_2\text{O}_3$  and Tc/MgO containing 1% Tc form linear and bridged surface structures. Also a multi-centered carbonyl structure is formed for Tc/MgO. By studying spectra of diffusive reflection for all stages of catalyst preparation, it was established that in the most active catalysts, except metallic Tc, an ionic form of Tc ( $\text{TcO}_4^-$ ) is preserved which displays a modifying effect on dehydrogenation of alcohols and cyclohexane. The ionic form of Tc fulfills a double role. It is a carrier for the metal and a transmitter of electron density from the metallic phase to the carrier. The disclosed formation of the ionic form in the Tc catalysts agrees with data for other catalysts. Figures 4; references 17: 14 Russian, 3 Western.

12886/12947  
CSO: 1841/524

UDC 541.128:546.11

CATALYTIC EVOLUTION OF HYDROGEN FROM AQUEOUS SOLUTIONS IN PRESENCE OF FINELY DISPERSED COPPER AND MOLYBDENUM

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 86 (manuscript received 20 Aug 84) pp 294-299

[Article by Ye. R. Savinova, Ye. N. Savinov, L. V. Gorodova, L. G. Chigladze, A. A. Belyy, Ye. I. Kuznetsov and V. N. Parmon, Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk; Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Preliminary data are given on the catalytic activity of finely divided Cu and Mo in the reaction of  $H_2$  evolution from aqueous solutions of strong inorganic reducing agents,  $V^{2+}$  (aq),  $Cr^{2+}$  (aq) and  $H_5(SiW_{12}O_{40})$ .

Finely dispersed Mo deposited on  $Al_2O_3$  and Cu, Pd and Rh on  $SiO_2$ , finely dispersed Cu, and Cu-water permeable ligand complexes were investigated. Cu and Mo, deposited on carriers or in suspension, display noticeable catalytic activity in the reduction of water to  $H_2$  and enlarge the scope of finely dispersed metallic catalysts for this reaction. Catalytic activity of these materials increases as pH is reduced to 0.2-0.6 in a  $2 \cdot 10^{-3}$  M solution of  $VSO_4$ . Catalytic activity of a Cu suspension was studied in a photocatalytic system containing  $H_4(SiW_{12}O_{40})$  as a photocatalyst and intermediate acceptor-carrier of electrons, which when exposed to ultraviolet light in ethanol (electron donor) was converted to  $H_5(SiW_{12}O_{40})$ , the reducing form. This study established that the mechanism of catalytic action of finely divided Cu is analogous apparently to the "microelectrode" model of the mechanism for the catalytic action of the colloidal noble metals. Figures 3; references 10: 2 Russian, 8 Western.

12886/12947

CSO: 1841/524

UDC 546.72+546.185-325:541.49

# CATALYTIC ACTIVITY OF IRON-PHOSPHATE COMPLEXES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 29 Jul 85) pp 527-530

[Article by M. A. Ismailova, Kh. M. Yakubov, Ye. Ya. Offengenden and  
A. N. Astanina, Tajik State University imeni V. I. Lenin, Dushanbe]

[Abstract] Studies were conducted on the efficiency of cysteine oxidation by molecular oxygen in relation to iron-phosphate complexes to determine the species responsible for catalysis. Plots of the rate of oxidation versus pH showed a maximum at pH 9.0, with a change in rate evident over a pH span of 7.0-10.0. The latter reflected a change in the composition of the coordinated iron-phosphate compounds with pH and their catalytic efficiency. Plots of the oxidative potential versus pH illustrated the complexity of complex-forming and protolytic processes, consisting of the formation of mono- and multinuclear complexes and a heterovalent compound. The latter compound-- $\text{Fe}_2(\text{III})\text{Fe}(\text{II})(\text{PO}_4)_2(\text{OH})_2$ --appears when the pH is adjusted from 7 to 9 and coincides with the pH of maximal cysteine oxidation. It is, therefore, evident that the heterovalent compound accounts for the catalytic activity exhibited by iron-phosphate solutions. Figures 4; references 7 (Russian).

12172/12947  
CSO: 1841/533

UDC 547.534.2:66.094.37:542.943:541.124

MODIFICATION OF O-XYLENE OXIDATION ON Va-Ti CATALYSTS BY GASEOUS MODIFYING AGENTS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 2, Mar-Apr 86 (manuscript received 15 Dec 83) pp 43-47

[Article by F. A. Ivanovskaya, D. Kh. Sembayev and B. V. Suvorov, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma Ata]

[Abstract] A study was conducted on the effects of ethylene and benzene on oxidation of o-xylene under gaseous conditions over  $V_2O_5:TiO_2$  catalysts varying in the ratio of components. In terms of phthalic anhydride production, addition of 0.3-0.9 moles benzene increased the yield from a control value of 64 to 75% at 400°C. The presence of ethylene at 405°C with a 1.0:0.5 catalyst increased the yield of phthalic anhydride to 75-78%. The effects were evident only with high- $V_2O_5$  catalysts, and predicated on competitive adsorption of benzene and ethylene to active sites on the catalyst. Both additive gases bind to sites that prevent building of the aromatic nucleus of o-xylene, thereby preventing oxidation of the benzene ring of the latter and selectively favoring the formation of phthalic anhydride. These observations indicate that gaseous modifying agents may form a promising approach to controlling oxidative processes in such situations. Figures 3; references 9: 6 Russian, 3 Western.

12172/12947  
CSO: 1841/534

UDC 665.644.2.097.3.002.2

# IMPROVEMENT OF PRODUCTION OF MICROSPHERICAL CRACKING CATALYST

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86 pp 10-11

[Article by Ya. V. Mirskiy, A. P. Kosolapova and N. F. Meged, Groznyy Petroleum Scientific Research Institute, Groznyy Petroleum Institute imeni Academician M. B. Millionshchikov]

[Abstract] Opinions of a group of researchers, who assume that the best way to improve KMTsR catalyst production is to increase the aluminum oxide in its amorphous part, are described and discussed. The group recommends a type Y zeolite catalyst containing rare-earth catalysts of the lanthanum-cerium group. An amorphous aluminosilicate part provides the necessary thermal stability of the zeolite. Addition of  $Al_2O_3$  to the KMTsR catalyst improves it.

Comparison of catalysts prepared by this new method and those prepared by previous methods with one of the world's best catalysts shows the superiority of catalyst prepared by the new method in all major indicators. This catalyst has a matrix specific surface (nearly  $50 \text{ m}^2/\text{g}$ ) which cannot be achieved by use of previously used technologies. References 11: 10 Russian, 1 Western.

2791/12947  
CSO: 1841/522

UDC 661.183.6.05:665.637.7

IMPROVED QUALITY MICROSPHERIC MgA ZEOLITE FOR SEPARATING n-PARAFFINS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86 p 12

[Article by L. M. Ishchenko, A. V. Shumovskiy, Zh. A. Grigoryants and V. I. Zozulya]

[Abstract] A new technique for producing improved microspherical MgA zeolite uses enriched kaolin containing practically no sand and aluminosilicate additives of precise composition, introduced into the kaolin suspension instead of sodium silicate. Introduction of the additive improves the mechanical strength of the zeolite and produces ideally formed spherical particles after spray drying. Tests of this new microspherical zeolite on a pilot device showed that the technique produces n-paraffins of more than 98 percent (mass) purity with practically total extraction of paraffin from the raw material. Adsorption capacity of the zeolite was unchanged after 2000 hours of operation. The high mechanical strength of the zeolite ensured stability of the technological regime and 1320 hours of operation without an additional charge (average zeolite expenditure for total time of operation was 3.3 g/10 kg of raw materials).

2791/12947

CSO: 1841/522

UDC 665.644.2.06

EFFECT OF SILICON-CONTAINING COMPONENT ON PROPERTIES OF CRACKING CATALYSTS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86, pp 29-30

[Article by V. F. Klaptsov, B. F. Nefedov, A. A. Maslova and M. A. Khlebnikova, All-Union Scientific Research Institute, Petroleum Industry, State All-Union Scientific Research Institute, Petroleum Industry]

[Abstract] A study of the effect of the nature and quantity of the silicon-containing component on catalytic activity, bulk density and wear resistance of cracking catalysts containing 20 percent (mass) of zeolite Y in rare-earth form is described and discussed. Increase of the silicon-containing component decreases wear resistance, especially for catalysts synthesized with use of silicon oxide ash. Clay and kaolin reduce wear resistance by approximately the same amount. The use of clay makes it possible to synthesize catalysts with relatively reduced catalytic activity but with high wear-resistance and bulk density. Substitution of silicon oxide or kaolin for clay reduces catalyst activity significantly. Wear resistance is almost the same after use of kaolin and clay and surpasses wear-resistance of catalysts containing amorphous silicon dioxide. Kaolin is the best silicon-containing component for use during synthesis of cracking catalysts based on zeolite in rare-earth form and pseudoboehmite. References 4 (Russian).

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EFFECTS OF METHODS OF PALLADIUM-ALUMINOSILICATE CATALYST PREPARATION ON  
ACTIVITY AND SELECTIVITY IN 2-ETHYLANTHRAQUINONE HYDROGENATION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 2, Feb 86  
(manuscript received 7 Aug 84) pp 360-363

[Article by Zh. A. Ikhsanov, V. Ya. Kitaygorodskaya, L. V. Pavlyukevich,  
G. N. Bayeva, Ye. S. Shpiro and A. B. Phasman]

[Abstract] The role of  $\text{Na}_2\text{CO}_3$  in the preparation of Pd-aluminosilicate catalysts for hydrogenation of 2-ethylanthraquinone (EAQ) was analyzed in terms of catalytic efficiency and selectivity. The concentration of  $\text{Na}_2\text{CO}_3$  used for the treatment of the carrier had no effect on the bulk or surface composition of the catalyst, but markedly affected the extent and distribution of Pd on the carrier. In the absence of  $\text{Na}_2\text{CO}_3$ ,  $\text{PdCl}_2$  was not adsorbed to the aluminosilicate, with the degree of adsorption increasing with an increase in the concentration of  $\text{Na}_2\text{CO}_3$ . In addition, higher concentrations of  $\text{Na}_2\text{CO}_3$  resulted in finer particles of Pd, which ranged from 40 to 5000 Å depending on the concentration of the former. Tabulated data on the catalytic activity on the hydrogenation of EAQ demonstrated that, with 0.8% Pd catalysts, 2-ethylanthrahydroquinone was formed in 100% yield, whereas, with 0.9 to 2% Pd, the yield of 2-ethylanthrahydroquinone was 94% and of 2-ethyltetrahydroanthrahydroquinone 6%. Figures 1; references 10: 6 Russian, 4 Western.

12172/12947  
CSO: 1840/525

UDC 541.7.128.13:546.215

CATALYTIC DECOMPOSITION OF HYDROGEN PEROXIDE ON ANTHRAQUINONECYANINE AND  
PHTHALOCYANINE METAL COMPLEXES IN ACID AND ALKALINE ELECTROLYTES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHNOLOGIYA in Russian Vol 28, No 12, Dec 85 (manuscript received 3 Jan 84)  
pp 46-50

[Article by S. N. Pobedinskiy, A. A. Trofimenko and M. A. Zharnikova, Depart-  
ment of Physical Chemistry, Ivanovo Institute of Chemical Engineering]

[Abstract] A study of octaoxyanthraquinonecyanines (OOATsM) and phthalocyanines (FTs) of cobalt, iron and manganese determined their catalytic activity in the hydrogen peroxide decomposition reaction. Hydrogen peroxide decomposition on OOATsM and FTs of the metals studied follows the kinetic mechanisms of a reaction of the first order regardless of the central ion of the metal. Complexes with a central atom of iron are most active in decomposition of hydrogen peroxide. Catalytic activity of FTsFe exceeds that of FTsCo more than 10-fold. FTs are 10-fold greater than OOATsM in catalytic activity. Change from an acid to an alkali medium did not affect the kinetic mechanisms of the decomposition reaction but the reaction rate on both a carrier and on metal complexes is higher in an alkaline medium than in an acid medium. The affect of an alkaline medium on the hydrogen peroxide decomposition rate is greater for FTS complexes than for anthraquinonecyanines. Figures 2; references 5: 3 Russian, 2 Western.

2791/12947  
CSO: 1841/513

UDC 541.128

DISPERSION OF COPPER (II) PHTHALOCYANINE APPLIED TO SURFACE OF OXIDE CARRIERS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 60, No 3, Mar 86  
(manuscript received 2 Jan 85) pp 745-746

[Article by T. G. Borisova, L. N. Izmaylova, Ye. I. Komov, B. V. Romanovskiy and V. V. Semin, Chemistry Faculty, Moscow State University imeni M. V. Lomonosov; Leningrad State University imeni A. A. Zhdanov; Scientific Research Institute of Physics]

[Abstract] Samples of copper (II) phthalocyanine (PcCu), attached to the surface of SiO (PcCu/SiO<sub>2</sub>) and type Y zeolite (PcCu/NaY) by a "surface build-up" method were studied by electron paramagnetic resonance and diffusion reflection methods. Electron paramagnetic spectra were not seen on the surface of these carriers of associates of phthalocyanine complexes but the diffusion reflection method suggests that they may form on the silica gel surface. Spectrometric data indicate that PcCu/SiO<sub>2</sub> samples may contain associates of Pc-complexes attached by the "build-up" method, on the carrier surface but this is not confirmed by use of the electron paramagnetic method. Figures 3; references 6: 4 Russian, 2 Western.

2791/12947  
CSO: 1841/496

## CHEMICAL INDUSTRY

### INTEGRATED PROGRAM OF CHEMIZATION

Moscow KHIMIYA I ZHIZN in Russian No 3, Mar 86 pp 2-8

[Article by USSR Minister of Chemical Industry V. V. Listov: "Chemization Program"]

[Text] The 27th CPSU Congress opened up a qualitatively new stage of the social-economic development of our country. Radical changes in the economy are planned: a decisive switch onto the track of intensive growth and an all-around increase in the effectiveness of the economy.

Large-scale, depth, complexity--these are the features which distinguish the tasks that Soviet society is resolving and must yet resolve in the coming years. It is sufficient to recall that in a total of only 15 years, by the year 2000, we face the task of creating a productive potential which will be equal in its scale to that accumulated during all the preceding years of Soviet rule. The Basic Directions of Economic and Social Development of the country confirmed by the congress make concrete the proposals of the new edition of the CPSU Program, and translate them into the language of specific plan targets for the next three 5-year periods. An important role in the radical acceleration of the country's social and economic development must be played by comprehensive chemization of the economy, by the rapid development of chemistry as one of the sectors determining scientific-technical progress.

Today our country has a highly developed multisectorial chemical industry which occupies the leading levels in the world. This sector of the economy relies on a powerful raw materials and fuel-energy base, and produces practically all forms of chemical goods known in the world. It has become one of the leading and most dynamic sectors of the Soviet economy, an important factor of technical progress and intensifying social production. In the last 2 decades alone, the volume of production of plastic goods has increased by a factor of 6.5, chemical fibers and threads by 3.4, and synthetic detergents by a factor of 8. Another great step in the development of Soviet chemistry was taken during the years of the last five-year plan, the 11th, which consolidated the successes achieved.

Chemization unquestionably provides a substantial effect in any sector of the economy. Every ruble spent for chemical agents to raise the productivity of agricultural crops brings in additional produce worth 7-8 rubles. One million

tons of plastic pipes saves the economy 1.5-2 billion rubles worth of capital and combined costs. Each hour spent to produce and process plastics saves 4-5 hours of labor; the production and use of a million tons of plastic allows us to free 300,000 individuals for other tasks.

It is easy to understand, for example, why 80 percent of the goods manufactured today in the electronics industry are made using polymer materials, while by 1990 this percentage is scheduled to reach 90 percent. It is easy to understand why the automotive industry plans to triple the amount of plastics used in a single light motor vehicle.

In just the last few years the country has organized the production of about 20 ultrapure substances for fiber optics. In all, the industry of chemical reagents and ultrapure substances produces over 12,000 different products: ferroelectrics, monocrystals, luminophores, and so forth. And each year a tenth of the catalog of these ultramodern materials is updated.

Much might be said about other successes and achievements of the sector. But nevertheless the chemical industry still does not fully satisfy the needs of the economy either in quantity or quality of goods produced. And this has a negative effect on the rates of technical progress in many sectors.

Even before the 27th CPSU Congress, in October of last year, the party and government adopted an Integrated Program of Chemization of the USSR Economy for the period up to the year 2000, which planned the following things:

to supply the economy's need for chemical goods corresponding to the requirements of scientific and technical progress;

to radically develop sectors of the chemical industry;

to raise the effectiveness of using chemical products by comprehensive application of them, rational combination with traditional materials, and expanded spheres of consumption of them in various sectors of the economy;

to accelerate the adoption of chemical processes and methods of processing natural, industrial, agricultural, and secondary raw materials, and the utilization of wastes for more complete involvement of useful components.

These are the main tasks of chemization. It should be carried on in several basic directions. The first of these is agriculture. In accordance with the USSR Food Program, it is planned to significantly increase deliveries, expand the assortment, and raise the quality of mineral fertilizers and chemical plant protection agents, make broad use of polymer materials in manufacturing pipes for the needs of land reclamation, film materials for greenhouses, packaging materials for agricultural produce, chemical preservatives of succulent feeds and grain fodder in order to retain the nutrients in them, and increase the deliveries of amino acids and microelements for feeds, veterinary compounds, and other chemical goods necessary to the agroindustrial sector of the economy.

Another direction is the widespread use of chemical goods in the manufacture of consumer goods--clothing, footwear, furniture, household goods. Chemists must supply the needs of health care and the medical industry, polygraphy, cinematography, photography, and other spheres of service for the basic types of chemical goods. Here the Integrated Program of Chemization comes close to another union program in spirit--the program for consumer goods.

There are other important directions of chemization. These include extensive use of nonrenewable natural resources--ores of ferrous and nonferrous metals, oil, gas, coal, and mining and chemical raw materials--increased deliveries and expanded assortment of flotation agents, chemicals for drilling projects, for more effective recovery of oil, and materials necessary for the production of drilling and mining equipment, for the construction of mining enterprises, shafts, and open pits. The connection between the program of chemization and the USSR Energy Program is completely clear.

Acceleration of scientific and technical progress in machine-building sectors is also a component part of the program of chemization of the country's economy. Substantial increases of labor productivity should be achieved in this sector, as well as reduction of the output of metal-consumptive goods, and increased service life thanks to wider use of plastics, synthetic resins, varnishes, and paints, and industrial rubber goods.

Electronics, radio engineering, communications technology, and rocket and space technology will be fully supplied with ultrapure substances, especially polymer materials and articles made from them.

Is it necessary to mention the importance of chemization of construction, including construction of living space? This sector of the economy must receive from the chemists a wide range of polymers for construction and finishing buildings: shaped articles and translucent sheet materials, nonflammable foam plastics and cementing materials for floors, mastic compounds for nonrolled roofing, and many other things which will help to significantly reduce the material- and labor-intensity of construction and raise its quality.

Finally, chemization penetrates deeply into the sphere of services, the sphere of medical, consumer, and cultural service.

Above all, important decisions have been taken concerning the development of the chemical industry. But the Integrated Program of Chemization is strikingly different from all past programs of this sort--primarily because of its scale, its multitude of directions, goals, and tasks, and its embrace of all sectors of our economy, without exception. This has never occurred during the entire history of development of the sector: all previous decisions touched on the chemical industry alone. Now, the chemical industry will work for the entire economy, and all of its sectors jointly will begin working for chemization.

Scientific-research, experimental, and project-design tasks in all sectors connected with the chemical industry will be accelerated and expanded. Great tasks have been set before chemical machine building, and construction and assembly organizations which are erecting chemical enterprises. The economic

mechanism, planning, and administration in sectors of the chemical complex are being perfected.

We have taken into account the whole enormous circle of problems which can in one way or another affect the resolution of the truly universal national task: questions of training cadres of specialists for chemical sectors and expanding residential construction for chemists--all of this has been reflected in the Integrated Program. Finally, one more extremely important and urgent problem--the problem of skilled and effective use of chemical products.

Today there is no getting away from the fact that the effectiveness of the entire economy and each sector of it is largely determined by the level of chemization. And the level of chemization depends not only on the output of chemical goods--how much fertilizer or film is produced per hectare of land, how much polymer materials go into a single tractor or combine--but on the rational use of these goods, on the scientific soundness, the level, if you will, of their use. Broad propagandizing of chemical goods, of their effective use, is an important task of chemists.

This entire complex set of problems is scheduled to be solved in a well-planned fashion, in two stages.

In the first stage, mainly in the 12th Five-Year Plan, priority will be given to chemization of agriculture and group "B" sectors of the industry. Thus, social tasks should be resolved first--increasing the production of food products and industrial consumer goods, and questions of health care, education, sports, and tourism.

During the same stage it is planned to supply chemical goods as comprehensively as possible to sectors connected with the USSR Energy Program which determine scientific and technical progress: electronics, electrical engineering and radio engineering, and instrument building.

During these same years it is planned to substantially increase the use of polymer materials in the construction complex, expand the use of secondary resources, and eliminate the disproportion which has developed between the raw materials and processing sectors of the chemical complex; a scientific-technical base should be created for industrial assimilation of fundamentally new chemical materials and fundamentally new technologies.

By the end of the first stage a springboard will be created for further accelerated development of the chemical complex, and above all polymer production, for extensive chemization of the entire economy.

The main task of the second stage (1991-2000) is radical reconstruction of the entire chemical complex of the country, full transition to the most progressive technologies, to the manufacture of advanced chemical materials with the highest usage properties--for all sectors of the economy.

Let us translate this into the language of numbers.

The Basic Directions of development of the economy planned for the chemical and petrochemical industries are to increase the volume of production of goods by 30-32 percent. In 1990, to bring the output of mineral fertilizers up to 41-43 million tons, chemical plant protection agents to 440,000-480,000 tons, synthetic resins and plastics to 6.8-7.1 million tons, chemical fibers and threads to 1.85 million tons, and synthetic rubbers to 2.7-2.9 million tons.

The production of synthetic resins and plastics in 1990 will surpass the 1985 volume by almost 135 percent, and in the year 2000 it will be 2.3-2.6 times higher; the production of chemical fibers by the end of the century will be brought to 2.85-3 million tons. Their relative proportion in the total consumption of textile raw materials will increase from 40 percent in 1990 to 50 percent in the year 2000. As a result, the per capita production of chemical fibers, plastics, and synthetic resins will increase by a factor of 1.8-2.2, and synthetic detergents, paints and varnishes, and synthetic rubbers by a factor of 1.3-1.5.

A few more figures: chemization of the wood-processing and pulp and paper industry will make it possible by the year 2000 to increase by a factor of 1.5-2 (as compared to 1985) the production of wood particle boards, fiberboards, and plywood, and save up to 7.5 million cubic meters of timber.

We have now indicated the major directions of chemization of the economy. Let us examine some of them in greater depth.

The main goal of chemization of the agroindustrial complex is to increase productivity, maintain and increase the quality of the goods produced by farming and livestock raising, and raise the effectiveness of agriculture and other sectors of the agroindustrial complex. The chemical industry is a major supplier of goods to the agroindustrial complex. We are now producing over 200 substances directly for agriculture, and also for almost 20 sectors connected with the production of food products for the population.

Our country has created the most powerful mineral fertilizers industry in the world. Currently the main attention is being focused on improving their quality, raising their content of nutritive substances, and producing concentrated and complex fertilizers.\*

The Soviet chemical industry is today manufacturing a wide assortment of chemical plant protection agents. Facilities have been created for the production of herbicides for sugar beets, for fighting pests in corn and cotton fields. Plans for coming years call for the construction of new major production facilities of chemical plant protection agents, and the wide use of these compounds will promote the transition to an industrial technology of cultivating many agricultural crops. In doing this, chemists face the task of supplying agriculture with compounds which are not only highly effective, but also, a very important consideration, minimally toxic for humans and animals and safe for the environment.

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\* This was thoroughly discussed in an interview with A. G. Petrishchev, minister for the production of mineral fertilizers (KHIMIYA I ZHIZN, No 2, 1986).  
--Ed.

Currently the livestock-raising sector is successfully using proteins from microbe sources, amino acids, vitamins, enzymes, electrolytes, and various pharmacological agents. They are yielding a substantial economic effect. The following data have appeared in the press: the use of growth-stimulating compounds has made it possible for farms of the Ukraine and Moldavia to obtain additional meat worth almost 3 million rubles within just one year.

Feed additives are necessary helpers in preventing mineral deficiencies, in fighting avitaminosis and other animal diseases. They are making it possible to economize on feeds, including grain, which is especially important in the winter.

Calculations show that, using various additives, grain consumption for cattle throughout the entire country might be reduced by 20 million tons.

Practice has confirmed the high economic effectiveness of polymer films in agricultural production. On the average, every ton of such materials provides an economic effect of over 4,000 rubles. Where did the savings come from? In the construction of greenhouses, film materials make it possible to reduce capital expenses to one-fourth, sometimes even one-fifth. Losses of silage, hay, and mineral fertilizers are halved with storage under film.

Naturally, agriculture places greatly varied demands on film materials. For example, films used in the construction of greenhouses must be highly transparent, photo- and thermostable, photosensitive, and hydrophilic. For steaming soil in hothouse farming, thermostability is required, and for mulching--a good light-reflecting capacity and the ability to degrade under atmospheric conditions after a certain use lifetime. We are offering kolkhoz and sovkhoz farmers a selection of films with greatly varied properties. For example, films which are excellent at permitting rays of the entire solar spectrum to come through and are photo- and thermostable are used in the construction of hothouses and tunnels. They are very effective--each ton of films makes it possible to save up to 5,000 rubles. The 108-82 film, for example, is used mainly for the installation of greenhouses and sheltered ground; its use makes it possible to raise the yield of early vegetables by 10-15 percent by improving the thermal conditions: at night the temperature under such a film is 4°C higher than it ordinarily would be.

Chemists have learned how to make films which reflect and disperse the solar radiation which comes in to greenhouses and screens, and thus protect the plants from overheating. They are widely used in winter fields of citrus, grapes, and other crops, in vegetative multiplication of fruits and berries. Their lifetime is up to 4 years. Outstanding properties are possessed by photodestructible film, which degrades after 2 or 3 months in the ground, mixes with the soil, and is completely annihilated by microorganisms. The economic effect from using this film is 20,000 rubles per ton.

Another polymer product of the sector is also extremely important for agriculture--tubes made from polyethylene and polyvinyl chloride, corrugated polyethylene tubes for irrigating soils, flexible rotating hoses for irrigating and sprinkling machines, hoses reinforced with a rigid spiral used in machines for chemical processing of fields, plastic parts for agricultural

machines, polyethylene and polypropylene screens, and superstrong tapes and twine necessary for packing agricultural produce. Use of polymer materials raises labor productivity in land reclamation and water resource construction by 15-20 percent. The economic effect of using plastics in tractor and agricultural machine building is over 1,000 rubles per ton.

These figures speak for themselves.

In order to free natural fibers, vegetable oils, and food products for the production of consumer goods, enterprises must find full-fledged analogues and substitutes for them. This is an important task of the chemical industry.

The sector is carrying out a great deal of work to increase the output of products of precise organic synthesis, various substitutes for natural fats and oils which are used today for technical purposes. The replacement of natural fibers with chemical materials must go on at a still more rapid rate. The production of new types of fibers which are full-fledged substitutes for natural ones is planned. Mixtures of natural, artificial, and synthetic fibers will be used more widely in the production of fabrics, clothing, and other goods. Thanks to the improvement of paints, textile-boosting substances, and other chemical agents, the quality of textile and knitted goods is increasing.

The production of artificial leathers for various purposes, toys, and household goods made from polymer materials will be expanded. Widespread adoption of new chemical materials (polyester and polyamide adhesive melts, polyurethane compositions and thermoelastic plastics for shoe soles, agents for finishing natural leathers) will make it possible to substantially improve the technology and raise labor productivity in the leather and footwear industry.

It is planned to create production facilities for new types of artificial leathers and suede for the sewing industry, and reinforced films using open-weave synthetic fabrics for manufacturing toys, as well as increasing the production and expanding the assortment of synthetic detergents and also solvents for chemical cleaning.

The increased use of chemical fibers in light industry, their expanded assortment, and improved quality are making it possible to ensure a substantially increased commodity circulation in the 12th Five-Year Plan.

Of course, the base for comprehensive and integrated chemization of the economy and the entire material sphere of our life is still the country's chemical complex. This is understandable: without development of production of important types of chemical goods it is simply impossible to implement such complex tasks, to satisfy the growing needs of all sectors of the economy.

In the next 15 years, sectors of the chemical industry will develop at an accelerated rate thanks to the increased scientific-technical level of chemical production facilities, growth of the production potential, and more effective use of capacities, material and labor resources. Thanks to the very rapid development of sectors of the chemical complex, the relative proportion of chemical goods in the total industrial production will reach 8 percent by the year 2000.

The Integrated Program of Chemization calls for raising labor productivity in sectors of the chemical complex by a factor of 2.3-2.5, reducing the number of workers engaged in manual labor by a factor of 4-4.5, and economizing on raw materials and fuel energy resources by a factor of 1.5-2, all by widespread adoption, in all production facilities, without exception, of advanced processes and technological layouts, comprehensive use of raw materials, processing poorer raw materials, raising the energy-technological effectiveness of the equipment used, implementing energy-technological layouts and combined energy cycles, expanding the use of secondary raw materials and energy resources, utilizing wastes, and reducing consumption norms, especially of very scarce raw materials, raw food products, and valuable metals.

It is planned to replace the catalytic systems in basic technological processes with a new generation of catalysts having increased activity and selectivity, reliability and service life. In the 12th Five-Year Plan, 40-50 percent of existing catalysts will be updated. Finally, chemists face the task of ensuring wide use of membrane processes not only in other sectors but also in the chemical industry itself.

The sector has developed an expanded program of scientific-research and experimental-design projects, which will be fulfilled in close contact with the USSR Academy of Sciences, republic academies, and VUZes. We have accumulated a great deal of experience of this sort of creative collaboration. Not long ago, for example, a joint meeting of the Ukrainian Academy of Sciences Presidium and the board of directors of the Ministry of Chemical Industry was held, at which participants examined the results of joint projects in the 11th Five-Year Plan and tasks of scientists to accelerate scientific and technical progress in the sector during the 12th Five-Year Plan. Collaboration between Ukrainian scientists and chemists of the sector has been going on for more than 10 years. More than 150 institutes, laboratories, and enterprises are participating in the collaborative research, including the Institute of Electrical Welding imeni Ye. O. Paton. The Kiev Scientific-Research Center was created to coordinate the projects. During these years 20 major innovations were developed and adopted through their joint efforts, with a total economic effect of 103 million rubles.

We must achieve an intensification of the sector's industrial potential which has already been created in union republics and major economic regions. This must be done on the basis of technical solutions, taking into account the specifics of the natural and economic conditions of each region. The program calls for integrated use of raw materials, bringing production facilities close to their sources, to the fuel-energy resources--this will make it possible to reduce large-tonnage transportation back and forth in all places. In arranging the chemical and petrochemical industries, the first thing to be resolved will be questions of reconstruction and technical reoutfitting of the entire production base built up in the sectors, especially in the European regions of the country, and also questions of protecting the environment--adoption of every possible low-waste and waste-free technology, maximum utilization of wastes, and the use of advanced methods of purifying waste waters.

I would like to touch on questions connected with preserving the environment in a little more depth. Let me begin with something which is one of the

essential aspects of chemization of the economy--the production of a great variety of goods which are specifically for the protection of the environment. These include activated carbons and other adsorbents, thermostable and chemically stable materials and fabrics, coagulants, flotation agents, surface active substances, ion exchange resins, reagents, catalysts, various filters, and polymer membranes. Also many other things which are necessary for purifying and rendering harmless industrial exhaust gases and wastewaters, recovering and enriching useful minerals, and starting up advanced technological processes in other sectors of the industry.

Questions of protecting the environment are being dealt with in the sector today based on an integrated approach, on the basis of plans for the future which have been drawn up. Let me remind you that back in the 9th Five-Year Plan we chemists were the first in world practice to include targets for protecting the environment in the annual plans. The USSR has established the most stringent norms for maximum allowable concentrations of harmful substances in exhaust gases. Tens of millions of rubles have been spent to develop and adopt technological processes and equipment which will make it possible to sharply reduce the exhaust gases in the atmosphere and industrial wastewaters in the reservoirs.

This work will be unfolded on a still greater scale during the implementation of the integrated program of chemization. It is our firm conviction that it is possible to develop highly industrial chemical production without harm to the environment.

In this 5-year period, not for the first time, we are confidently advancing into the eastern regions of the country--Siberia and the Far East. In the next 15 years, this advance will go on at still more rapid rates.

Siberia has already created major territorial-production complexes and industrial centers which have at their disposal powerful energy resources, large reserves of raw materials, and all the conditions necessary for people to live and work. These are the West Siberian, Angarsk-Zima-Usolskiy, and Kansk-Achinsk complexes. The industrial centers which are part of them have been built up and are actively operating--Kemerovo, Omsk, Tomsk, Tobolsk, Novosibirsk, and others. For the chemical industry, with its characteristic multitude of ways of processing natural raw materials, wide assortment of goods produced, and abundance of secondary products and wastes, this form of organization of production is especially effective. In addition, the chemical industry, exceeding the economic effectiveness of social production in the region, can and must become the basic nucleus of the industrial sector--both an intermediate link in the complex chain of processing natural materials and its final stage.\*

We will continue to develop existing large territorial-production complexes and industrial centers and form new ones before the end of the century in various regions of the country--Pavlodar-Ekibastuz, Timan-Pechora, the Caspian

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\* The development of the chemical industry in the eastern regions of the country is discussed at greater depth in V. V. Listov's article "Main Warehouse, Major Shop" (KHIMIYA I ZHIZN, No 10, 1985).--Ed.

region, and other territorial-production complexes. The chemical industry will become their nucleus. Questions of transporting chemical goods and reducing their losses will be resolved simultaneously. Further development is planned for pipeline transport, transport in containers and packages, and in special tanks and cars. Plans call for expanding the bulk transportation of chemical products in granulated form; new tanks, warehouses, and storehouses must be constructed for storing products in port and transfer stations.

In Siberia and in the Far East, in Central Asia and Kazakhstan, on the Lower Kama and in the Urals--in all places where a great chemical construction is planned, where territorial-production complexes and industrial centers are forming--large capacities will be created for the construction of enterprises and mounting of equipment, frequently unique. Chemical machine building will be developed at extremely rapid rates. It is sufficient to say that during the 12th Five-Year Plan the output of chemical equipment and spare parts will increase by a factor of 1.5, and by the year 2000 by a factor of 3. Industrial construction methods are making it possible to use highly completed structures and ready-made technological lines, to switch over to constructing chemical plants to be turned over "turnkey."

Chemistry has long since become an arena of international cooperation between scientists and specialists of various countries. Active participation by the Soviet Union in the international division of labor is promoted by the well-developed structure of our chemical industry, its powerful industrial and scientific potential, greatly varied natural resources, the capacity of our domestic internal market, and the great export capacities of the country. We are successfully solving many important economic and scientific-technical problems in close collaboration with other socialist countries.

The integrated program of chemization calls for further development and perfection of direct bilateral ties between related enterprises of fraternal countries, and expansion of scientific and technical collaboration with the socialist countries in order to accelerate the resolution of various scientific and technical problems. From the multitude of examples of this collaboration, let me cite one very characteristic case--collaboration in the field of plastics processing by our Plastik Scientific Production Association and the Central Institute of the Chemical Industry in the People's Republic of Bulgaria. Soviet chemists provided their Bulgarian colleagues with technical documentation on the equipment and organization of the industrial production of reinforced plastic high-pressure hoses. Within a very short time, they were corrected and working designs sent back according to which the Kom Plant in Berkovitsy prepared and assembled a line for producing hoses. And the Bulgarian chemists perfected this production and created a second generation of technological equipment which won a gold medal at the International Fair in Plovdiv.

As is well known, in December of last year the 41st (Extraordinary) Session of the Council of Economic Mutual Aid was held in Moscow, confirming the Integrated Program of Scientific-Technical Progress of CEMA member countries up to the year 2000. Implementation of the Integrated Program, as CPSU Central Committee General Secretary M. S. Gorbachev emphasized, is called upon to make a great contribution in accelerating the social and economic development and

strengthening the unity and solidarity of the fraternal countries. The CPSU regards bringing to life the Integrated Program as a task of the entire state and party, a political task.

The program, which is of a comprehensive nature, determines specific joint ways of concentrating the efforts and funds of CEMA member countries in the main areas, accelerated development of which will serve as the determining factor for intensifying the entire economy and achieving the highest level along the entire front of scientific and technical progress as we enter the new technological era of the 21st century.

The program determines five main directions of expanding collaboration: electronicization of the economy; integrated automation; accelerated development of atomic energy; new materials and technologies for producing and processing them; and accelerated development of biotechnology.

The chemists will participate very actively in implementing most of the clauses of the Integrated Program, and for polymer materials (the chapter on "New Materials and Technologies for Producing and Processing Them") the Ministry of Chemical Industry has become the head organization--the coordinator. A great work lies ahead of us, which will require the concentrated efforts of chemists of all the fraternal countries.

The Integrated Program of Chemization calls for a radical shift to intensive methods of developing the entire chemical complex of the country based on new technology and equipment, and better use of production capacities, labor resources, and material resources; this should ensure a substantial rise in the effectiveness of social production, and promote successful resolution of important social-economic tasks.

The economic effect from chemization of the economy and development of sectors of the chemical complex over the course of the next 15 years will total more than 450 billion rubles.

We have achieved much during the years of the last five-year plan, but the sector still has many shortcomings, unresolved problems, for which we have received justified criticism. Accomplishing the assigned tasks will require that all workers in the chemical industry substantially raise the quality of work, reach a turning point in the use of intensive factors of growth, and ensure the most rapid adoption of the achievements of scientific and technical progress.

Bringing to life the Integrated Program of Chemization of the Economy of the USSR for the Period Up to the Year 2000 will further enhance the well-being of the Soviet people. This has been pointed out again and again by the decisions of the party, which chemists of the country are greeting as a guide to action.

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12255/12947  
CSO: 1841/528

## INTER-SECTOR EXHIBITION OF CHEMICAL CONSUMER GOODS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 8, Aug 85 pp 78-80

[Article by M.A. Platkov, Scientific-Research Institute of Fertilizers and Insecto-fungicides]

[Text] "Chemical Products for the Soviet People" was the slogan of the inter-sector exhibition which took place at the same time as the scientific-technical conference entitled "Tasks of the Chemical Branches of Industry in the Development of Production, the Expansion of the Variety and the Improvement of the Quality of Consumer Goods for the 12th Five-Year Plan and up to the Year 2000."

Enterprises of Minkhimprom (Ministry of the Chemical Industry), Minudobreniy (Ministry of Mineral Fertilizer Production), Minneftekhimprom (Ministry of the Petroleum Refining and Petrochemical Industry), Glavmikrobioprom (Main Administration of the Microbiological Industry), Minlegprom (Ministry of Light Industry) and Minpishcheprom (Ministry of the Food Industry) of the USSR demonstrated products at the exhibition, which was held in March 1985 in the city of Kazan. Officials from the CPSU Central Committee, the Council of Ministers of the USSR and the RSFSR, USSR Gosplan, the USSR People's Control Committee, the USSR State Committee on Science and Technology, Minkhimprom, Minudobreniy, Glavmikrobioprom, Mintorg USSR (USSR Ministry of Trade), USSR Gosstandart, officials of the Tatar CPSU Obkom and the Tatar ASSR Council of Ministers took part in the work of the All-Union scientific-technical conference.

The conference and its six sections (everyday chemical products; photochemical products; paints; goods made from plastics, fiber glass and chemical fibers; mineral fertilizers and chemical means of plant protection; rubber footwear and other rubber goods) considered the main ways to develop production, to re-tool, and to improve the variety and quality of the consumer goods produced by enterprises of the ministries and agencies participating in the conference.

The problems of waste-free technologies, environmental protection, the improvement of containers and package design for everyday chemical products and other questions were discussed. More than 700 delegates, who heard approximately 80 reports, participated in the conference.

Products from more than 500 enterprises were represented in the sections and at the display booths; the total number of exhibits totaled about 6,000.

The synthetic washing substances (SWS) were the most important group of everyday chemical products. Represented at the exhibition were all-purpose SWS's, including "Lotos" and "Universal-A"; SWS's with controlled suds, including "Lotos-avtomat," "Era-avtomat," "Oka," "Superal," and "Olan"; SWS's for low temperature washing such as "Oka," "Bio-S," "Bion," "Bio-BkhS," "Fermenta," "Bio," and "Bio-Mig," multi-purpose preparations such as "Olan" and "Elona" which have antistatic properties, and "Veselka" and "Fantaziya," which have coloring properties.

Products in aerosol form are very popular with the public. The country produces about 120 such preparations for various purposes. Products to combat domestic insects and perfume-cosmetic goods constitute the basis of the aerosol range. A significant selection of hair sprays was represented: "Prelest," "Anemona," "Moskvichka," "Neznakomka," as well as a range of deodorants: "Illuziya," "Kvetka," "Renat-Renata," "Aromat," and others.

Household chemical products produced jointly with the GDR under the name of "Domokhim" were demonstrated (Domokhim produces more than 30 products for various purposes.) They include the SWS's "Oka" and "Lotos-avtomat," the cleaning substances "Sanitarnyy-1," "Chistol-ekstra," and "Sanfor," a product for cleaning stoves and ovens called "Parma-1," preparations for car care; the "Lana-1" antistatic agent, products for reviving velour and leather, a starching agent for collars and cuffs called "Elegant," air fresheners called "Kok," "Toyleks" and others.

The individual booths contained displays of products to fight common insects, glues, paints and varnishes, plastic items, movie and photographic products; tapes, chemical fibers and products made from them, and other products for household purposes.

Soyuzparfumerprom (the All-Union Association of the Perfume-Cosmetics and Essential Oils Industry) presented for display a small assortment of perfume and cosmetic items in souvenir and gift packages; these items were produced by the association's leading enterprises: the Moscow Novaya Zarya Perfume Factory; the Leningrad Severnoye Siyaniye Perfume-Cosmetics Combine; the Kazan Perfume-Cosmetics Factory and the Riga Dzintars Production Combine.

Production associations and enterprises of the Minneftekhimprom demonstrated samples of polymer and polymer-textile footwear in a wide range (galoshes and other boots of various kinds, athletic footwear), items made from rubberized fabrics (boats, canoes, mattresses, life jackets, diving suits for underwater swimming), suits made from cellular rubber for yachtsmen, suits for fishermen, hunters and amateur racers, as well as other consumer goods.

At the display booths in the Minudobreniya section more than 60 enterprises presented the basic types of mineral fertilizers and the chemical agents for plant protection available for retail sale and use in private subsidiary farms, as well as everyday household and personal products.

Nitrogen, phosphorous and potassium fertilizers packaged in small amounts were displayed: superphosphates--of a simple granulated (20 percent  $P_{2O_5}$ ) and double granulated brand "B" (40-47 percent  $P_{2O_5}$ ); carbamide of brands "A" and "B" (46-46.7 percent N); ammonium sulfate (20-21 percent N) and potassium chloride (58-60 percent  $K_{2O}$ ).

The comprehensive and complex fertilizers produced in small packages are most effective on private plots and gardens. The following representatives of this group were demonstrated: ammophos (12-13 percent N and 49-51 percent  $P_2O_5$ ), nitroammophos (24 percent N and 24 percent  $P_2O_5$ ), nitroammophoska (17:17:17) and nitrophoska (11:10:11).

Minudobreniya enterprises have begun to produce nitrogen-phosphorus-potassium fertilizers (10:20:20) with a full array of trace elements, which not only increase plant yields, but also have a positive effect on the taste properties of the fruit and increase their vitamin and protein content. The fertilizer is applied on all types of soil planted with all types of agricultural crops. Also on display were fertilizer mixtures such as vegetable garden and fruit-berry brand No 5 with and without boron and flower mixture No 3.

Various preparations to protect against pests and diseases of fruit-berry, vegetable and other crops which are raised on private plots and gardens were presented; carbophos, triphos, sulfarid, nitraphen and izofen. Among the fungicides mention should be made of polikhom (an 80-percent wetting powder), which is applied to combat apple and pear scab, phytophthora and blight on tomatoes, phytophthora on potatoes and mildew on grape vines. The leaves of plants treated with polikhom become inedible for Colorado beetles. Among the new products there is a trap with an acenol attractant for male codling moths--a non-insecticide means of reducing populations of codling moths, which infect peaches, quinces, and apricots.

Of the insecticides, benzophosphate (a 10-percent wetting powder) was displayed. It is used to spray plants during the vegetation period against sucking and leaf-chewing pests, including the Colorado beetle on potatoes, tomatoes and eggplants and the codling moth on apples, pears, plums, cherries, peaches and apricots.

A number of insecticide preparations effective against the Colorado beetle were presented: mesox (a 25 percent emulsion concentrate), insectofoksim (a five-percent emulsion concentrate), foksim (a 5-percent wetting powder), which is also applied to combat caterpillars of cabbage white butterflies and of owlet and other moths on cabbage; klizar (the same as rovikurt, a 5-percent emulsion concentrate), which is used to spray plants during the vegetation period against the Colorado beetle on potatoes, eggplants and tomatoes, as well as against leaf-eating and sucking pests on potatoes, cucumbers and tomatoes on protected soil, and on cabbage, cherries, apple trees, grape vines, currants, and gooseberries.

The range of chemicals permitted for use on private plots includes the preparation chloroethanol (keltan), a 20-percent emulsion concentrate. Our domestic industry is producing experimental batches of keltan to study public demand. The preparation is used to combat spider mites (in all phases of development) on berries, citrus and other fruits, vegetables, cucurbits, flowers and decorative crops, as well as on grape vines.

The promising insecto-fungicides include oleokuprit, which is used for early spring spraying of apple trees against the wintering stages of pests and disease agents, and the fungicide medex, which is used to treat potato and tomato plants against phytophthora infection.

The microbiological industry demonstrated fodder supplements for livestock, biological preparations which suppress the mass reproduction of harmful insects and preparations which influence soil fertility such as risotorphine, which increases the yield of bean crops. In addition, preparations used in the food and perfume industry and in medicine were represented, as were other products produced for the public at Glavmikrobioprom enterprises.

A separate section of the exhibition was devoted to the successes achieved by the chemical workers of Tataria in the fulfillment of the Comprehensive Program for the Development of Consumer Goods and the Service Sphere. Tataria has quite a few enterprises which are making a substantial contribution to ensuring that the national economy has diverse and high-quality chemical products. They include enterprises and associations of the Nizhnekamsk-neftekhim Association, which produce rubber boots; children's, men's and women's winter boots; as well as garden hoses and other products for the public.

The Tasma Production Association produces about half of all the amateur photographic film produced in the country. This association also produces recording tapes, cellophane tape and many other items. The Kazanbytkhim Production Association puts out about 20 everyday chemical products in aerosol form. Consumers are very familiar with "Malva," an all-purpose compound for washing clothes; "Lana," a product for antistatic treatment of synthetic materials; deodorants and other consumer goods which are produced in Tataria.

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8543/12947

CSO: 1841/170

SYSTEM FOR AUTOMATING SCIENTIFIC-TECHNICAL AND CONSTRUCTION WORK

Moscow PRAVDA in Russian 3 Jan 86 p 3

[Text] Yerevan (TASS). A new system for automating scientific-technical and construction work was created by specialists at the Computer Center of the Armenian SSR Academy of Sciences.

Scientists from the Institute of Fine Organic Chemistry at the republic's Academy of Sciences were the first to examine the system. In half an hour of machine time, they carried out analyses of all the preparations recently developed at the Institute. The introduced system is intended to serve academic science departments.

/12947

CSO: 1841/306-P

LONG TERM FRUIT STORAGE IN MEMBRANE-CONTROLLED GAS MEDIA

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 2, 21 Jan - 3 Feb 86 p 4

[Article by V. Belyakov, Director General, "Kriogenmash" Scientific-Production Association, corresponding member, USSR Academy of Sciences]

[Abstract] The author's Association has been studying membrane technology for the control of the content of gas media since 1968. In cooperation with French scientists, a technology has been developed for the manufacture of gas-separating membranes of polyvinyltrimethylsilane capable of doubling the content of oxygen in air in a single pass. The 40% oxygen air is useful in medical technology, while the 3-5% oxygen air produced on the other side of the membrane can be used for a year to store fruit and vegetables unspoiled. The membrane is still more selective for mixtures of hydrogen and helium. Automatic environment regulating units called BRASes are now in use for storage of thousands of tons of fruit in regulated gas media. Figures 2.

6508/12947

CSO: 1841/387

## CHEMICAL INDUSTRY PROGRAM OF IMPROVEMENT

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 85 pp 707-711

[Article by V. V. Listov, Minister of the Chemical Industry]

[Abstract] Like all workers in the Soviet Union, workers in the chemical industry are struggling to meet with honor the 27th CPSU Congress. Successful completion of 1985 represents a good start for the 12th Five-Year Plan, a Plan of great changes to the economic life of the nation. The new tasks set forth for the industry by Comrade Gorbachev will require further improvement of the economic mechanism. A complex program of chemization of the entire economy of the USSR by the year 2000 has been developed, encompassing all major spheres of the economy and calling for significant increases in the output of chemical products. The chemical industry has achieved great successes in past years, but still has the capability for further achievement. A number of organizational measures are currently being employed to bring science and production closer together, an organizational restructuring which is occurring in parallel with a detailed analysis of all themes of scientific research. The most important thing today is analysis and design plus effectiveness. Scientific workers and planners must work hand in hand to improve the quality of construction of chemical facilities. The major resource of the industry is reported to be its fine people. More active utilization of advanced forms of organization of labor with independent financing of teams can utilize this great preserve to achieve radical improvement in the chemical industry.

6508/12947  
CSO: 1841/361

## TECHNICAL PROGRESS IN CHEMICAL INDUSTRY

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 85 pp 711-714

[Article by V. Keshishev]

[Abstract] A discussion is held with B. N. Lishchin, the director of the "Azot" Production Association in Severodonetsk. Azot is among the most successful chemical plants in the Soviet Union, and Lishchin shares some of the secrets of their success, including energy conservation measures which have allowed a savings of 28 million kw·hr of electric power and 41,600 Gcal of heat energy, as well as 604,000 rubles worth of materials in six months. This has been achieved by reconstruction of obsolete facilities, which in turn required reconstruction of the investment and construction policy of the plant. An important aspect has been a firm association between research and production. As a result, the plant has achieved good results in economy and efficient utilization of resources during the 11th Five-Year Plan. Rationalizers' suggestions, and inventions by the workers at the Association, have made a significant contribution to the savings of resources, with over 17,000 suggestions and 105 inventions resulting in 19.1 million rubles savings in four years. Engineering and technical workers are trained at the plant in close connection with practical tasks requiring solution and in accordance with the plans of the Ministry for Production of Mineral Fertilizers. The team of engineers at the plant is quite capable of solving the problems of technical progress which life presents.

6508/12947

CSO: 1841/361

AUTOMATION OF CALCULATIONS ASSOCIATED WITH PRODUCTION OF AMMONIA AND SOME OF ITS ANALOGS

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 85 pp 749-754

[Article by I. M. Kisil, A. I. Glauberman, A. Ya. Raskin and V. I. Mukosey]

[Abstract] A study is reported of the principles of automation of the design of a complex chemical-industrial system using a computer, allowing a reduction in the length of planning while increasing planning effectiveness and quality. Chemical technology calculations refer to the determination of the material and heat balances of a production process and determination of the basic technological parameters of all apparatus and key points of the chemical production system. The process consists of determining that apparatus which is significant for the chemical process and calculating the heat and material balances for that significant apparatus. Algorithms are described for this computation for ammonia production. The algorithms were used to create a software system consisting of five subsystems: the general program support subsystem, the general technological support subsystem, library for computation of physical and chemical properties of gas mixtures, subsystem for design of apparatus for producing ammonia, hydrogen, methanol and certain other nitrogen and non-nitrogen production processes, and a subsystem of ammonia modules, which designs synthesis columns, ammonia condensers and other directly related equipment. Figures 2; references 6 (Russian).

6508/12947

CSO: 1841/361

CONCEPT OF CREATION AND FUNCTIONAL STRUCTURE OF SYSTEM FOR AUTOMATED  
COMPUTATION OF STANDARDS OF LABOR AND WAGES FOR ENTERPRISES WITH CONTINUOUS  
PRODUCTION PROCESSES

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 85 pp 754-760

[Article by A. N. Aleksandrov]

[Abstract] A study is reported of problems of development of automated subsystems for computing standards for labor and wages at the enterprise level, maintaining a data base of information used for organization and payment of labor and information on actual and planned labor and wage costs for all categories of workers. A flow chart of the operation of the system for automated computation of actual labor and wage consumption is presented and the structure of the software used to support the automatic wage cost computation system is described. References 1 (Russian).

6508/12947

CSO: 1841/361

## COAL GASIFICATION

UDC 665.44

### MODIFICATION OF BROWN COAL AND PEAT WAXES WITH ETHYLENE OXIDE

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript received 15 Jul 85) pp 73-76

[Article by P. I. Belkevich, I. V. Koleda, A. I. Nekrashevich, G. M. Prokhorov and V. P. Shubin, Peat Institute, BSSR Academy of Sciences]

[Abstract] In a study of oxyethylation of organic compounds present in brown coal and peat waxes, the effect of temperature and the nature of catalysts was investigated, along with its quantity, on the rate of ethylene oxide addition, composition of the products obtained and their physical-chemical properties. This process is a complex of sequential and parallel reactions between ethylene oxide and acids, alcohols and complex esters which are components of these waxes. The optimal conditions for these reactions are: temperature: 170-180°C, catalyst: KOH or NaOH (1% of the quantity of wax) and pressure of 0.1-0.5 atm. With increasing degree of oxyethylation, the hydrophilicity of modified waxes increased. The waxes containing more than 76% of ethylene oxide exhibited surfactant properties. Figures 3; references 9: 6 Russian, 3 Western.

7813/12947

CSO: 1841/531

UDC 541.115+541.12.038+541.183+662.642

STUDY OF FORMATION CHARACTERISTICS OF NICKEL HYDROGENATION CATALYSTS  
MODIFIED WITH HETEROPOLYMERS AND OF THEIR ADSORPTION PROPERTIES

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript  
received 25 Jul 85) pp 94-99

[Article by M. D. Navalikhina, G. V. Grebenshchikova and N. V. Glushchenko,  
Institute of Fossil Fuels]

[Abstract] The goal of this work was to investigate the characteristics of dehydration and other thermochemical reactions of various nickel catalysts, and methods of their preparation, especially those of the most active catalyst. Results of differential thermal analysis and thermogravimetry of nickel hydrogenation catalyst containing up to 4% Ni were reported, along with model systems of Ni- $\text{-Al}_2\text{O}_3$  type modified with tungsten heteropolymers. It was shown that, in contrast to  $\text{WO}_3$ , tungsten heteropolymers used as modifiers of nickel catalyst, lowered the  $\text{H}_2\text{O}$  adsorption capacity of  $\text{-Al}_2\text{O}_3$ . Thermal treatment of the modified catalyst results in a sharp increase of  $\text{H}_2\text{O}$  adsorption capacity. The most active hydrogenation catalyst modified with tungsten adsorbs water so tightly that it can be removed only by heating the material to 500-675°C. Figures 4; references 14: 13 Russian (1 by Western authors), 1 Western.

7813/12947  
CSO: 1841/531

UDC 662.75:542.941

PROSPECTIVE USE OF NOVEL NON-TRADITIONAL METHODS FOR PROCESSING SOLID FUELS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript received 12 May 85) pp 3-13

[Article by A. Ye. Sheyndlin, I. V. Kalechits and V. G. Lipovich, Institute of High Temperatures, USSR Academy of Sciences]

[Abstract] In spite of substantial progress in production of liquid motor fuels from coal so far, all of these processes cannot compete even with processing of very expensive crude petroleum oil. Original estimates of full production in the 80's are now reestimated for much later periods. This situation led partially to search for novel non-traditional methods of coal gasification and liquefaction. Literature data on this topic are reviewed. Intensification of coal gasification can be achieved over catalysts and alloys; the following series of efficiency was noted  $Rb > Cs > K > Na > Li$ . The catalytic process can be carried out at 700°C instead of 1100-1600°C. Innovative processes use salt-metal alloys which serve as catalysts and heat carriers (Rockwell International and Sumimoto Metals). Traditional coal liquefaction methods start with liquid phase productivity which has low yields. Considerable attention was paid to improve this step. The new methods being developed concentrate on the use of heterogeneity of the organic mass in coal (supercritical solution) or on its modification to increase its solubility; this resulted in development of the supercritical extraction processes. The most effective compounds in this process are those capable of dissolving organic matter and acting as hydrogen donors. Reductive alkylation of coal is another novel approach which, in addition to higher solution of organic matter leads to breakdown of heterocyclic bonds. References 76: 17 Russian (4 by Western authors), 59 Western.

7813/12947  
CSO: 1841/531

UDC 553.061.17 + 553.94

EFFECT OF DEGREE OF CAUSTOBIOLYTE METAMORPHISM ON COMPOSITION OF GASES  
EVOLVING DURING THEIR SYNTHETIC CARBONIZATION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript  
received 26 Jul 85) pp 45-51

[Article by M. Ye. Petrikovskaya, R. G. Makitra, Ya. M. Vasyutin, V. A.  
Gavenko, V. Ye. Tarasyuk, N. Y. Kucherko and R. I. Flyunt, Institute of  
Geology and Geochemistry of Fossil Fuels]

[Abstract] The goal of this work was to study the composition of gases  
emanating during thermolysis of coals, to determine quantitative relationships  
among individual components of the gas phase as a function of the degree of  
metamorphism of starting material. An attempt was made to model as close as  
possible natural carbonization processes. In all experiments, elevation of  
temperature increased the rate of gas formation; methane concentration  
appeared to increase significantly more than that of its homologues. With  
increased carbonization, hydrogen was found in 8-40% amounts. To improve the  
model, the material was heated at 300°C in presence of water for 24 hrs in a  
totally filled autoclave. Considerable gas evolution occurs in the early  
stages. An antibatic relationship was noted between the content of CO<sub>2</sub> and  
CH<sub>4</sub>: with increased CO<sub>2</sub> the level of CH<sub>4</sub> diminished (peat and brown coal) and  
the reverse occurred in black coal. The extent of the formation of methane  
depended on the degree of carbonization of the carbon. Figures 5; references  
10: 9 Russian, 1 Western.

7813/12947  
CSO: 1841/531

UDC 539.973

BIOLOGICAL AND CHEMICAL COMPOSITION OF ORGANIC MATERIALS IN LOW-ASH CONTENT  
SAPROPELS OF BSSR

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript  
received 17 Dec 84) pp 14-21

[Article by G. A. Yevdokimova, O. N. Uspenskaya, V. V. Kukharchik and  
O. M. Bukach, Peat Institute, BSSR Academy of Sciences]

[Abstract] Biologic and chemical composition of organic material of aspropels with less than 40% ash from various lakes in BSSR were studied. The test samples were collected from the thickest layer, after determining its stratigraphic structure. The principal biologic components (up to 65%) were algae and peat forming plants. Animal organisms were found rarely, comprising at most 15-25%. Overall, five groups of sapropels were identified: complex algae, zoogeno-algae, peat-algae, peat and dust-peat. The characteristics of the genesis and chemical composition of sapropels affect their physical properties. Algae sapropels are more aqueous, giving stable emulsions. Peat type sapropels are somewhat less moist and their emulsions separate much faster. References 23 (Russian).

7813/12947  
CSO: 1841/531

UDC 665.442.9:665.521.2

# HYDROPURIFICATION OF LIGHT-MEDIUM TAR FROM HIGH VELOCITY KAU PYROLYSIS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript received 19 Nov 84) pp 100-103

[Article by T. G. Maslyanskaya, V. A. Itskovich and L. P. Tsudikova, Leningrad Technologic Institute imeni Lensovet]

[Abstract] Energotechnical processing of Kansk-Achinsk coal (KAU) yields considerable amounts of liquid products which could serve as starting materials for hydrocarbon fuel. However, this material contains many components complicating its utilization. To obtain a practically useful product, it needs further purification. One of such methods is hydropurification, the results of which are reported. The optimal conditions for hydropurification of light-medium tar from high velocity pyrolysis of KAU are: industrial catalyst NVSA (aluminum-nickel-tungsten-sulfide), temperature 400°C, hydrogen pressure 5 atm. The product obtained contained 87.31% carbon, 12.32% hydrogen, 0.23% nitrogen, 0.14% oxygen and less than 0.01% sulfur; the content of unsaturated compounds was low and the product represented a 1:1 mixture of benzene and diesel fuel. Figures 2; references 2 (Russian).

7813/12947

CSO: 1841/531

UDC 774.62:311

COMPARATIVE EFFECTIVENESS OF PHENOL REMOVAL FROM WATER BY EXTRACTION AND ADSORPTION METHODS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript received 29 Oct 84) pp 112-115

[Article by R. P. Kochetkova, S. A. Eppel, V. F. Serebryakov and M. G. Inozemtseva, Institute of Petroleum and Carbochemical Synthesis]

[Abstract] Use of solid fossil fuel leads to air pollution with organic agents including phenolic substances. Water is also polluted by them. Normally, effluents are purified by extraction of phenols with butyl acetate and benzene, but this procedure still leaves considerable quantities of phenol behind. Comparison of this purification method with one based on adsorption showed that the latter was more effective when the initial concentration of phenol was in the range of 0.5 to 5 g/l. An analytical expression is derived relating the degree of purification to the coefficient of distribution which adequately characterizes the effectiveness of water purification from phenol. Figures 2; references 5 (Russian)

7813/12947  
CSO: 1841/531

UDC 622.023.6:620.197.3

USE OF BROWN COAL HUMATES IN HYDROTRANSPORTATION OF COAL

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 86 (manuscript received 25 Jun 85) pp 135-138

[Article by Yu. N. Zubkova, V. L. Basenkova, A. V. Butyugin and A. L. Antonova, Donetsk State University]

[Abstract] The main task in hydrotransportation of coal is to obtain highly concentrated viscous suspensions and to lower corrosive activity. The goal of this work was to study the effect of brown coal humates on rheological and corrosive properties of concentrated coal suspensions. It was shown that they possess good activity, especially in presence of divalent iron and calcium cations because, in their presence, very thin adsorption layers are formed with solvation-hydration properties. Combined with the use of humates and chromates this leads to considerable savings in comparison to the use of chromates alone. Figures 2; references 6 (Russian).

7813/12947

CSO: 1841/531

TEMPERATURE ACTIVATION OF PHOTOCURRENT IN COMPENSATED SEMICONDUCTORS WITH  
IMPURITY EXCITATION

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA FIZIKO-  
TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH in Russian No 5, Sep-Oct 85  
(manuscript received 24 Dec 84) pp 11-19

[Article by Ya. A. Agayev, G. Garyagdyev, A. V. Lyubchenko, S. Sultanmuradov  
and K. R. Ovezov, Turkmen Polytechnic Institute]

[Abstract] A study is reported of the photosensitivity of crystals with arbitrary degree of compensation upon impurity excitation of recombination centers in "sensing" a-centers, when the impurity photoeffect is great and may be comparable to the natural effect. The phenomenon of temperature activation of photocurrent is described, caused by thermal charge transfer between centers of attraction of the basic nonequilibrium charge carriers and recombination. The study of the temperature variation of dark and photocurrent significantly expands the information provided by experimental data in the sense of identification of mechanisms of activation of photocurrent at low temperatures and development of a method for determining parameters of centers of attraction and recombination. Figures 4, references 5 (Russian).

6508/12947  
CSO: 1841/367

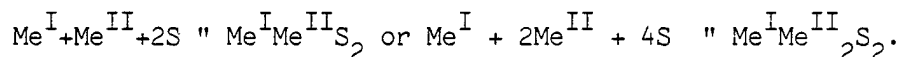
UDC 521.1:.6

STUDY OF THIOSPINELS BASED ON VARIABLE VALENCE METALS AS ELECTROCHEMICAL  
COMBUSTION CATALYSTS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR: SERIYA B: GEOLOGICHESKIYE,  
KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 85 (manuscript  
received 3 Jun 85) pp 38-41

[Article by A. N. Sofronkov, L. I. Korolenko, and V. S. Yakovenko, Odessa  
Institute of Technology imeni M. V. Lomonosov]

[Abstract] The authors synthesized thiospinel catalysts, studied their physical and chemical properties and the possibility of their use as cathodes in electroreduction of molecular oxygen. The thiospinel catalysts were obtained by a pyrometallurgical method:



X-ray analysis was conducted in filtered copper radiation. The catalysts were tested for activity in a model reaction of decomposition of hydrogen peroxide. The studies indicated that thiospinels can be used as catalysts for the oxygen electrode of an electrochemical current generator. Figures 2; references 12 (Russian).

6508/12947  
CSO: 1841/385

UDC 543.251

ELECTROCHEMICAL SEPARATION OF URANIUM AND IRON

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 2, Feb 86  
(manuscript received 31 May 83) pp 299-302

[Article by V. T. Chuyko, A. V. Kuprik, B. V. Pismennyy and T. V. Chuyko]

[Abstract] Reports in the literature that passage of an AC current through a solution of transition metals leads to the formation of hydroxide precipitates led to studies on using an electrochemical method for the separation of Fe and U from sulfate and nitrate solutions. Preliminary experiments demonstrated that iron hydroxide precipitates in passage of a 50 Hz AC through iron sulfate and nitrate solutions at 60°C. Trials with solutions containing both Fe and U showed that effective separation of the metals was achievable with a 50 Hz AC current at 60°C, with an optimal pH of 3.0-3.1 for the sulfate solution and 2.6-2.7 for the nitrate solution. References 7 (Russian).

12172/12947

CSO: 1840/525

UDC 539.219.3:541

EFFECT OF HYDRATION ON PROTON CONDUCTIVITY OF SOLID ELECTROLYTES BASED ON  
POLYANTIMONIC ACID

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE,  
KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 2, Feb 86 (manuscript  
received 18 Jun 85) pp 37-39

[Article by T. A. Karaseva, T. M. Lityuga, A. D. Martsenyuk-Kukharuk and  
T. M. Telbiz, Institute of General and Inorganic Chemistry, UkSSR Academy of  
Sciences, Kiev]

[Abstract] A study of the effect of processes of thermic dehydration of  
polyantimonic acid on its proton conductivity employed measurements of  
electroconductivity of samples pressed with platinum electrodes in a wide  
temperature range at constant rate of heating. Heating a sample in air  
changed its specific electroconductivity significantly. Loss of water  
molecules of the polyantimonic acid in relation to heat treatment proceeded  
in 3 stages. Free, or physically adsorbed, water is removed in the 1st  
stage. Heating in the 2d stage (150-250°C) causes further water loss due to  
removal of zeolite-like water from ultrapores of the electrolyte. Heating  
in the 250-350 °C range and further loss of mass is associated with breakdown  
of structural  $\text{=Sb-OH}$  of the hydroxyls. It is assumed that the firmly  
adsorbed and capillarily-condensed water forms a single system with protogenic  
 $\text{=Sb-OH}$  groupings and this promotes rapid proton transport. Figures 3;  
references 12: 7 Russian, 5 Western.

2791/12947

CSO: 1841/502

UDC 539.143.43:546.791.6

EFFECTS OF NONELECTROLYTES ON STABILITY OF URANYL FLUORIDE LIQUID CRYSTALS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86 (manuscript received 3 Dec 84) pp 541-546

[Article by V. A. Mikhalev and V. A. Shcherbakov, Radium Institute imeni V. G. Khlopin, Leningrad]

[Abstract] PMR studies were conducted on uranyl fluoride-water-acetone systems to assess the effects of some 50 nonelectrolytes as stabilizers and destabilizers of the uranyl fluoride liquid crystals. The degree to which the organic compounds affected the system was determined by their basicity, as indicated by the comparison of the donor number of reagents (DN) with the corresponding  $P_{\text{H}}$  values over a -20 to +40°C temperature range. Thus, electrostatic interactions underlie the liquid crystalline properties of uranyl fluoride. The fact that the dielectric constants of the nonelectrolytes, exert such an effect suggest an analogy between the liquid crystalline state and lyophobic colloid systems. Figures 4; references 10: 8 Russian, 2 Western.

12172/12947  
CSO: 1841/533

## FERTILIZERS

UDC: 631.811.98

### PROSPECTS FOR APPLICATION OF PLANT GROWTH AND DEVELOPMENT REGULATORS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 8, Aug 85, pp 68-75

[Article by L.G. Gruzdev, candidate of biological sciences, All-Union Scientific Research and Planning-Technological Institute of Cybernetics]

[Excerpts] There are more than 5,000 known compounds which have a high rate of physiological activity with regard to the growth and development of plants; only 50 to 60 of them have been applied in practice.

In the USSR many scientific-research and planning-technological institutes of the USSR Academy of Sciences, the USSR Ministry of Agriculture (Minselkhov), the USSR Ministry of the Chemical Industry (Minkhimprom) and of certain other ministries and departments are working on the theoretical bases for the utilization of growth regulators, on their synthesis and on the improvement of application technologies. The USSR Minselkhov State Committee on Chemical Means of Plant Protection conducts comprehensive research on new chemical preparations before they are recommended for application in agricultural production.

Regulators of plant growth and development are used on the scale of both experimental-production and production to prevent grain and industrial crops from falling over, to delay the growth of shoots on fruit trees, to eliminate periodicity in their fruit bearing, to speed up or slow down their flowering, to prevent the germination of root and tuber crops during storage, to increase crop resistance to unfavorable environmental factors, to increase productivity and to improve the quality of the harvest.

In our country several million hectares are treated with growth regulators, mainly chlorocholine chloride (the preparation "tur"), every year. However, the amounts of growth regulators which are applied still do not satisfy the requirements of present-day agricultural production. The main reasons for this are the following: the lack of the necessary variety in the preparations available for various crops, areas of the country and industrial technologies; the fact that some of the preparations do not come in convenient forms and the lack of technical means to apply them, specifically crop dusting aircraft, which ensure that the drops have the necessary parameters. All these questions require immediate resolution; the attention of scientific-research, planning-technological and design organizations must be concentrated on them.

## Theoretical Bases for the Application of Growth Regulators in Plant Growing

Growth and development regulators of endogenous origin (auxins, gibberellins, kinins, ethylenes and others) help to regulate metabolism at all stages of plant life--from the development of the embryo to the final completion of the life cycle and death. They determine the formation of plants' new organs, their habitus, period of flowering, aging of their vegetative parts, the transition to dormancy and the emergence into that state, etc.

The most important features in the action of the phytohormones are their great specificity, which means that in their effect on physiological processes they cannot be replaced by other means or growing conditions, and their mutual dependence in achieving the activity of the metabolic stimulators and inhibitors within the general system of hormonal regulation, which ensures the coordination and functional integrity of the plant organism.

The emergence of the synthetic regulators of plant growth and development is related both to the attempts to obtain by chemical means the structurally well known phytohormones of the auxin, gibberellin and kinin groups, as well as to the development of the theory that substances which are structurally close to the endogenous phytohormones are physiologically active. The development of the idea that the successive stages of plant growth are controlled by specific activator-inhibitor pairs has contributed to this. Many paired components of the phytohormones have now been discovered and identified; others have been replaced in practice by synthetic growth regulators. Thus the overwhelming majority of synthetic regulators are either physiological analogs of endogenous phytohormones or they act as antagonists to them, while changing the general hormonal status of plants.

Synthetic regulators of plant growth can be divided into five groups according to the mechanism of their action: 1) preparations, related to metabolism of the auxins and to the achievement of their physiological activity (auxin analogs, anti-auxins, inhibitors of auxin transport); 2) substances related to the metabolism and achievement of the physiological activity of the gibberellins (analogs; inhibitors of biosynthesis); 3) preparations associated with ethylene metabolism; 4) cytokinin-like compounds; 5) activators and inhibitors of metabolism (stimulators of respiration, photosynthesis, inhibitors of the synthesis of carotinoids, chlorophyll, etc.). Naturally this kind of division is arbitrary for a number of compounds; this applies in particular to those regulators of metabolism which have an extremely complex mechanism of multiple action.

In every group there are new synthetic preparations, which are undergoing testing and experimental-production trials in various countries, including the USSR. Preparations which are being tested on various crops, but which are not being used in practice, are marked in the text with a star from this point on.

In the first group one can take note of 2-amino-6-methylbenzoic acid, which stimulates the ripening of tomatoes, the setting of fruit in apples, pears and certain pit fruit crops, as well as increasing the frost resistance of wheat, corn and grapes. The preparation etichlozate, which was synthesized in Japan, makes it possible to eliminate periodicity in the fruit bearing of apple trees

by thinning out the fruit in harvest years, when most of the setting takes place.

The second group includes the overwhelming majority of the retardants which are being used at the present time, in particular chlorocholine chloride. It has been used to establish that with the onium compounds the retardant effect results from inhibiting the enzyme kaurin synthetase. Among the new regulators in this group one can note the quaternary salt of polyaminoethylene as a retardant of flower crops and piperotannylbromide for cotton and tomato plants.

In the antigibberellin-acid hydrazide group there is paclobutrazol, which prevents grain crops in high soil fertility areas from falling over and increases their yield; it also raises the frost- and drought-resistance of apple trees and the marketability of the fruit. Among the promising growth inhibitors for flower growing and decorative gardening one can include dikegulak (atrinol). It is in this group that the largest quantity of blended preparations, such as arotex-5S, terpal and others, has been obtained and is being used. High soil fertility is absolutely essential for the effective application of the single-component and blended preparations in this group of regulators.

The third group of growth regulators, which influence a plant's ethylene content and metabolism, is represented by hydrel, dihydrel and campozan-M, as well as by the recently synthesized aminocyclopropanic acid and the preparations reliz and dimetipin. These preparations migrate freely within fruit and potato plants, and they accelerate the formation of a dividing layer. They are being tested in a number of countries as defoliants for cotton plants and desiccants for potato plants, as well as to determine whether they facilitate the harvesting of citrus fruits, grapes and other fruit crops.

Cytokinin-like regulators of plant growth are rarely used in practice due to the expense and complexity of the treatment technologies. Attempts are being made to obtain natural extracts of endogenous cytokinins from accessible plant raw materials and algae. However, this work is purely experimental at the present time.

Aside from the above-named groups of regulators, many natural metabolites are physiologically active; examples are provitamins, amino acids, di- and tricarboxylic acids. It is precisely the physiological activity of the natural metabolites of plants available for large-scale chemical production which must be utilized in practice when developing mixtures of growth regulators.

The integral effect which a majority of synthetic growth regulators have on plants can be divided into three stages: 1) primary interaction with endogenous phytohormones and their enzyme systems, 2) the emergence and functioning of a plant's induced enzyme systems with the changed hormonal status, 3) secondary changes in the general metabolism of the plant, which lead to deviations in growth, and in the size and quality of the harvest. Naturally the synthetic preparations which are of the greatest economic and hence the greatest research interest are those which make it possible to change (in a desirable direction) the habitus of the plants, to increase their

productivity and to improve the qualitative parameters of the harvest, as well as those which have an anti-stress action, which increases the resistance of various crops to unfavorable growth conditions.

#### Growth Regulators on Grain Crops

To prevent winter and spring wheat crops from falling over, chlorocholine chloride--2-chloroethyltrimethylammonium chloride (the preparation "tur") is utilized. The optimal dose of tur for treating 1 hectare of seedlings is 2-4 kg a.i. (active ingredient); water consumption per 1 hectare is 150-200 liters with ground spraying, with aerial spraying it is usually 25-50 liters, and with ultra small-scale spraying it is 5-6 liters. It is sufficient to treat the grain seedlings once in the spring in the mid-tillering--mid-booting phase, when the plants reach a height of 15-30 cm. During this period differentiation of the ear tissue is taking place; the activity of the leaves' meristems is coming to an end, and the lower internodes of the stem are being formed. When spraying is done at later times (closer to the end of ear formation), only the higher internodes are reduced, and the plants are not always effectively prevented from falling over. The maximum permissible level (MPL) of chlorocholine chloride in grain is 0.1 mg/kg; the LD<sub>50</sub> (lethal dose) for rats is 600 mg/kg.

Aside from the search for new, highly active compounds and convenient preparation forms, the creation of bi- and multicomponent blends of variously functioning preparations can be considered to constitute the most promising direction in the work with growth regulators on grain crops. These blends make it possible to mix the retardant and anti-stress effects of the ingredients, and to control the size and quality of the grain yield, as well as the mixture of plant growth and development regulators with elements of nutrition, ZhKU (liquid compound fertilizers), herbicides, fungicides and natural metabolites, which increase the regulatory effect of synthetic hormones. Mixtures of this kind must become important components of the industrial technologies for grain production of in our country.

#### Growth Regulators for Industrial Crops

The preparations hydrel, piks, chlorocholine chloride, rozalin, campozan-M and A-1 are used on cotton plants. Tur and campozan are also applied under production conditions on flax, and sodium humate is used on sunflower plants.

Piks stimulates the ripening of the cotton bolls and raises the plant's yield by 5-20 percent. When treating the seeds, it is applied in doses of 40-75 g/t; when spraying the plants with an aqueous solution the usage norms are 1-1.5 l/hectare (50-75 g a.i. per 1 hectare). The usage norm for piks when it is used as a defoliant for the cotton plant is 6-10 kg/hectare (spraying is done during the period when 2-5 bolls are opening). Campozan is used for a similar purpose, and chlorocholine chloride is widely used for chemical chopping of the cotton plant.

In general, the range of growth regulators available for industrial crops is inadequate; it requires substantial improvement in terms of numbers as well as the effectiveness and physiological activity of the preparations. It is

essential to expand research work in order to obtain effective stimulants for sunflowers, sugar beets, hemp and other crops; it is also necessary to expand the development of the application technologies for these preparations against a background of high norms for organic and mineral fertilizers.

#### Growth Regulators in Industrial Horticulture, Viticulture and Vegetable Growing

Chlorocholine chloride is used on apples and pears in order to accelerate the start of fruit bearing, to limit the growth of shoots, to increase crop resistance to unfavorable environmental factors, to reduce periodicity in fruit bearing and to increase the sugar content of fruits. Tur is used on winter varieties in the third-fourth year after planting, given good development of the trees. For apple trees the usage norm (kg/hectare on the basis of a.i.) is 3-5, and for pears it is 2-4; the concentration of the solution is respectively 0.5-0.6 and 0.2-0.4 percent. The first application is made 10-15 days after blossoming, and the second is made 12-15 days after the first, but no later than 80 days before harvesting. The total amount of the preparation used for both treatments should not exceed 10 kg/hectare for apples and 7-8 kg/hectare for pears. The MPL of chlorocholine chloride in apples and pears is 0.05 mg/kg.

In industrial horticulture, viticulture and vegetable growing it is necessary to direct attention to mixtures of growth regulators, which make it possible to speed up the ripening of produce and at the same time to facilitate its harvesting, to increase the size of the yield and to improve its quality and marketable appearance. Toward this end mixtures of multi-functional growth regulators should become effective, as should mixtures of synthetic regulators with a number of natural compounds which are physiologically active such as abscisic, ascorbic and itaconic acids, tyrosine, tryptophan, proline and phenylalanine, polyphenol derivatives, morphactins and other substances.

#### The Utilization of Growth Regulators in the Storage of Plant-Growing Products

The primary regulator which slows up vital processes in the storage organs of plants when they are being stored is GMK (maleic acid hydrazide). This preparation prevents premature germination of potatoes, sugar beets, onions, turnips, radishes, carrots and garlic during storage. This effect is achieved by spraying the plants with a 0.25-0.3 percent solution of GMK (1.3-2.7 kg/hectare of the preparation is used) 12-15 days before harvesting. It is essential to spray the green leaves in order to make the plant capable of fully absorbing the preparation and transporting it into the storage organs. When GMK is used, the losses of tuber and root crops during storage periods of 6-10 months are reduced 15-25 percent; the hydrolytic decomposition of high molecular weight compounds and sugars is slowed up, and the market ability at the end of the storage period is increased. GMK significantly reduces the intensity of respiration in onions, garlic, carrots and radishes held in storages, and it suppresses cell division. The MPL of the preparation in produce is 8.0 mg/kg.

Further research on the application of growth regulators in the storage of fruits and vegetables, including root and tuber crops, should be linked to the search for highly-effective preparations which inhibit the integral processes of vital activities during storage, which slow up cell division, respiration and the energy metabolism in cells.

#### Growth Regulators in Flower Growing and Decorative Horticulture

In this area, world practice includes the use of many preparations in limited volumes. Morphactins, antsimidol, chlorocholine chloride, phosphones, auxins and other compounds are used in commercial flower growing. Antsimidol, 4-methoxyphenyl (pyrimidyl-5)-cyclopropylcarbinol, is put out by the BASF company in the form of a 0.026 percent aqueous solution for spraying chrysanthemums, lilies, tulips and peonies. The application of the preparation in doses of 50-150 liter/hectare helps to even out the time periods between the onset of flowering, to extend the season in which flowering occurs, to make the flowers last longer and to improve their other qualities as well. Chrysanthemums are treated 1.5 months after growth starts; tulips and peonies are treated before flowering (after bud formation) and lilies when the stem reaches a length of 20-30 cm. The preparation is harm less to bees and useful insects; it has a low level of toxicity for warm blooded animals (the LD<sub>50</sub> for rats is 4500 mg/kg).

The specific nature of the action of plant growth and development regulators lies in the fact that they cannot be replaced by other traditional methods of crop cultivation; they are a reserve for increasing the yield and quality of output when the possibilities of fertilizers, irrigation and agricultural equipment have been exhausted. And in turn, the broad utilization of synthetic analogs of phytohormones can be developed only as an integral component of the general industrialization and chemicalization of plant growing and of a high level of land cultivation.

When one considers the problem of applying growth regulators in the future, it is essential to emphasize that this area--both in terms of the breadth of the research as well as in terms of the depth of theoretical solutions--still lags significantly behind other traditional areas in the chemicalization of agricultural production. It is essential to be more active in introducing capacities for the production of new plant growth and development regulators. It is necessary to expand scientific research on the comprehensive application of various chemical agents in the industrialization of technologies for crop cultivation. It is essential to coordinate more closely the scientific research work in this area, which is being conducted by many organizations belonging to various agencies. It is advisable to increase work in the following areas.

1. The intensification of genetic, physiological-biochemical and agrochemical investigations of the mechanism and nature of action by growth and development regulators, and the development on this basis of new generations of preparations and mixtures, as well as highly effective technologies for their practical application in order to control the functions of the plant organism.

2. The expansion and improvement of the range of preparations which are safe for the biosphere: a) to prevent grain, legume and certain other industrial crops from falling over and to increase the quantity and quality of their yields; b) to facilitate the harvesting of crops in industrial horticulture and viticulture; c) to grow vegetables on open and protected land and d) to extend the storage periods for the harvest once it has been gathered.

3. The development of a selection of anti-stressor preparations for the various crops and climatic zones of the country.

It is essential for the agricultural organs to increase the scale on which regulators of plant growth and development are utilized in production and to include these preparations in the new application plans. The agricultural ministries in the republics need to publicize the potential of growth regulators, and their mandatory application in the industrial technologies for growing agricultural crops.

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8543/12947

CSO: 1841/170

"SILVINIT" PRODUCTION ASSOCIATION'S FERTILIZER PRODUCTION BELOW PLAN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Apr 86 p 3

[Article: "NAMING THE LAGGARDS, "SILVINIT PRODUCTION ASSOCIATION"]

[Text] The collective of this once-leading enterprise has failed to fulfill the first-quarter plan and is in arrears to the Nonchernozem, Ural and Transural, and Central-Asia farmers. Since the beginning of this year, the mineral fertilizer production of the Solikamsk chemical workers is more than 70,000 tons below plan.

The "Silvinit" Production Association still has many problems to solve, although the VPO [All-Union Production Association] "Soyuzkaliy" has been trying to assist V. Negachev, the Association's general manager, and the leading specialists with stabilizing the key personnel and improving the availability of technology, transportation, and materials to the enterprises.

The chemical workers also have complaints against the construction workers. This year the association is supposed to receive a high-capacity granulator. However, the organizations of Glavzapaduralstroy [Main Administration of Western Ural Construction] of the USSR Minpromstroy [Ministry of Industrial Construction] pay little attention to the supply [komplektatsiya] of materials to the project and do not assign sufficient manpower. As a result, the first-quarter plan was fulfilled by only 72 percent.

12973/12947

CSO: 1841/529

PRODUCTION OF CATALYTIC SULFURIC ACID WITH LOW CONTENT OF NITROGEN OXIDES

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 12, Dec 85, pp 734-736

[Article by M. V. Lobova, V. S. Yepifanov, L. I. Gradusova, L. A. Artomasova, V. G. Meshcheryakov and L. V. Lavrentyeva]

[Abstract] Tests have shown that about half of all nitrogen oxides formed in sulfur-roasting furnaces by high-temperature interaction of nitrogen with oxygen in the air blast are converted from the gas to the liquid phase. Elimination of acid exchange between the oleum and monohydrate adsorbers should decrease the content of nitrogen oxides in the monohydrate used to produce battery grades of sulfuric acid. Thirty day testing of two versions of this technology was undertaken at the "Minudobreniya" Plant in Voskresensk. The tests showed 35 to 50% reduction in the content of oxides of nitrogen. Strict dosing of the reducing agents was also found effective in reducing nitrogen oxide content of the end product. Figures 2; references 12: 8 Russian, 4 Western.

6508/12947

CSO: 1841/361

UDC 621.382.2

ELECTRIC AND PHOTOELECTRIC PROPERTIES OF  $\text{Ga}_{1-x}\text{Al}_x\text{As}$  p-n STRUCTURES WITH THIN EPITAXIAL LAYERS

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA FIZIKO-TEKHNICHESKIKH KHIMICHESKIKH I GEOLOGICHESKIKH in Russian No 5, Sep-Oct 85 (manuscript received 16 Apr 85) pp 64-68

[Article by K. Annayev, A. Berkeliev and N. Nazarov, Physical-Technical Institute, Turkmen SSR Academy of Sciences]

[Abstract] Results are presented from a study of the electrical and photoelectrical properties of variband n-GaAs-p-GaAs-p- $\text{Ga}_{1-x}\text{Al}_x\text{As}$ - and p-GaAs-m- $\text{Ga}_{1-x}\text{Al}_x\text{As}$  structures. The study was performed on structures with a thin variband layer about 0.5  $\mu\text{m}$  thick in which the value of x increased smoothly from GaAs to the surface of the epitaxial layer from 0 to 0.35-0.8 in various structures. It is found that optimal structures are obtained by long holding times at the epitaxy temperature (45-60 minutes) with high AlAs content (over 80%) in the epitaxial layer. The results of these studies should facilitate improvement of the parameters of solar photoconverters and other optoelectronic instruments based on variband GaAlAs p-n structures with thin epitaxial layers. Figures 2; references 8: 6 Russian, 2 Western.

6508/12947

CSO: 1841/367

UDC 541.12.034.2:542.941:546.26-162+546.723'131

REDUCTION OF  $\text{FeCl}_3$ -GRAPHITE INTERCALATION COMPOUND WITH HYDROGEN AT HIGH PRESSURE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 86 (manuscript received 7 Mar 85) pp 450-452

[Article by V. L. Solozhenko, I. T. Belash, Ya. A. Kalashnikov and E. G. Ponyatovsky, Moscow State University imeni M. V. Lomonosov; Institute of Solid Body Physics, USSR Academy of Sciences, Chernogolovka; Institute of Super Solid Materials, UkSSR Academy of Sciences, Kiev]

[Abstract] Intercalation compounds of graphite and  $\text{FeCl}_3$  of composition  $\text{C}_{5.9 \pm 0.1} \text{FeCl}_3$  and  $\text{C}_{11.9 \pm 0.1} \text{FeCl}_3$  were prepared and reduced with  $\text{H}_2$  at 130-480°C at 20-70 kbar. Reaction products were studied by X-ray diffraction and Mossbauer spectroscopy. Intercalated compounds of graphite with  $\text{FeCl}_3$  were stable below 300°C at 20-70 kbar, but raising the temperature to 330-480°C reduced them to intercalated compound with Fe(II) chloride of general composition  $\text{C}_{(6.0 \pm 0.1) \cdot k} \text{FeCl}_{2.2 \pm 0.1}$  where k is 1 or 2 and a filled layer thickness of  $9.56 \pm 0.01 \text{ \AA}$ . The stage of this compound did not change with reduction. Kinetic data showed that the reduction rate is high and the reaction is complete in ~30 minutes, whereas complete reduction at low pressure takes ~12 hrs. Increasing the duration of the experiment to 10-15 hrs at high pressure, decomposes the reduced product to graphite and  $\text{FeCl}_2$ . Stability studies of the intercalated compounds of graphite with iron (II) chloride at high pressures and temperatures in inert materials, such as perfluorinated hydrocarbons used as media for transmitting pressures, did not indicate decomposition in the P-T range studied. The proposed method, which has a series of essential advantages over traditional methods, can be used for new intercalated compounds of graphite of the acceptor type. Figures 2; references 11: 6 Russian, 5 Western.

12886/12947  
CSO: 1841/524

UDC 661.662

CHEMICAL ENRICHMENT OF SUBSTANDARD KARATAU PHOSPHORITE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 2, Mar-Apr 86 (manuscript received 14 Feb 84) pp 3-6

[Article by A. I. Dzhurumbayev, R. Zh. Arstanova, R. S. Darer, Z. A. Nagimetova, I. N. Zadubrovskaya, S. B. Medeubayeva and I. V. Dmitriyeva, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma Ata]

[Abstract] Studies were conducted on the acid extraction of Mg from substandard Karatau phosphorite, using sulfuric, nitric and hydrochloric acids. Maximal recovery (60-68%) of MgO was obtained at pH 2 at 60-70°C with slow addition of the acid over 30 min to give a 120% concentration with respect to the stoichiometric concentration. Although all three acids were essentially equally effective in the removal of MgO from the phosphorite, best results for enrichment with  $P_2O_5$  (50.90%) were obtained with nitric acid. Figures 1; references 4 (Russian).

12172/12947

CSO: 1841/534

UDC 541.183:546.34

ADSORPTION OF LITHIUM BY INORGANIC CATIONITE BASED ON HYDRATED TITANIUM DIOXIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 86 (manuscript received 2 Apr 84) pp 263-266

[Article by A. N. Krachak, V. A. Nikashina, S. A. Khainakov and T. V. Stepanchenko, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow]

[Abstract] The properties of the hydrated titanium dioxide adsorbent (HTD), synthesized at the Institute of General and Inorganic Chemistry of the USSR Academy of Sciences, were studied. Experiments were made to evaluate the selectivity of the adsorbent for  $\text{Li}^+$  in the presence of competing ions ( $\text{Na}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ), to obtain equilibrium and kinetic characteristics, and to study the behavior of HTD under dynamic conditions. HTD in the  $\text{H}^+$ - and  $\text{Na}^+$ -forms and solutions containing 10-72 mg/l  $\text{Li}^+$ , 0.5-2.0 mol/l NaCl and 0-0.2 mol/l NaOH were used. HTD selectively adsorbs  $\text{Li}^+$  from salt solutions at  $\text{pH} \geq 12$ . Below pH 12 adsorption of  $\text{Li}^+$  was practically not observed. Kinetic experiments showed that under identical conditions adsorption of  $\text{Li}^+$  on the  $\text{H}^+$ -form adsorbent was slower and less than on the  $\text{Na}^+$ -form. Desorption was observed during long contact times (~6-8 hrs) of the adsorbent with lithium-containing solutions. The dynamic capacity of the adsorbent was increased with an increase of  $\text{Li}^+$  concentration in the solution. When the competing effect of  $\text{Na}^+$  was decreased by reducing the NaCl concentration from 2.0 to 0.5 M, the dynamic capacity of  $\text{Li}^+$  was tripled. The effect of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  on  $\text{Li}^+$  adsorption was relatively small. Figures 5; references 5: 4 Russian, 1 Western.

12886/12947  
CSO: 1841/524

UDC 628.543

CHEMICAL STABILITY OF MA-40 AND MK-40 ION-EXCHANGE MEMBRANES IN ORGANIC SOLVENTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 2, Feb 86  
(manuscript received 4 May 83) pp 474-476

[Article by K. M. Saldadze, Ts. S. Kurtskhaliya, D. I. Karaulashvili,  
Z. Sh. Simoniya, M. V. Nadirashvili and M. M. Arevadze]

[Abstract] An assessment was conducted on the stability of MA-40 (anion-exchange) and MK-40 (cation-exchange) membranes in different chemical media to determine their suitability in the production of caprolactam. The membranes were exposed to 25% aqueous solutions of either the lactam or anon [sic] raw material at either 20 or 50°C for up to 960 h, followed by evaluation of exchange capacity, selectivity and specific resistance ( $\text{ohm}\cdot\text{cm}^{-1}$ ). The data showed that any deterioration in the parameters of interest occurred within the first 5-10 days of exposure, and did not exceed 5-10% of the starting value. In addition, stabilization of the physico-chemical characteristics of MA-40 and MK-40 occurred more rapidly under electrodialytic conditions than under static conditions. Both membranes, therefore, were judged suitable for use in the production of caprolactam in the steps involving electrodialysis of the raw materials. Figures 2; references 7 (Russian).

12172/12947  
CSO: 1840/525

## NITROGEN COMPOUNDS

### CHEMICAL COMPOSITION OF CHROMATOGRAPHIC FRACTIONS OF PEAT WAX MODIFIED WITH ISOCYANATE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHMICHNYKH NAVUK in Russian No 6, Nov-Dec 85 (manuscript received 26 Jun 85) p 114

[Article by P. I. Belkevich, S. F. Aksinovich, T. T. Zuyev, Ye. A. Yurkevich, and S. V. Drozdovskaya, Institute of Peat, Academy of Sciences, BSSR]

[Text] The change in chemical composition of crude peat wax as a result of its modification with toluylene diisocyanate was studied. As a result of a specific reaction of some wax components with isocyanate, a product with urethane group in its structure was obtained and identified by IR spectroscopy. The extraction was conducted in a number of solvents: hexane, benzene, chloroform, a chloroform-ethanol (1:1) mixture, and a chloroform-ethanol + 5% acetic acid solution. It is established that modification of the wax with isocyanate allows the fraction of hydrocarbons to be cleaned of difficult-to-separate straight-chain alcohol impurities. The fractions, extracted by three successive solvents, consist of components with phenyl-urethane groups in their structure. Acids of peat wax in reaction with toluylenediisocyanate do not appear. Reaction of peat wax with toluylenediisocyanate is accomplished via hydroxy groups of the wax alcohols, hydroxy acids, and hydroxy ethers.

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/12947

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# THERMOOXIDATIVE BREAKDOWN OF CELLULOSE NITROETHERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHOLOGIYA in Russian Vol 28, No 12, Dec 85 (manuscript received 22 Feb 84)  
pp 92-95

[Article by V. V. Ovcharenko and A. T. Govorkov, Department of Organic  
Chemistry, Kemerovo State University]

[Abstract] Samples of commercial colloxylin containing 12 percent nitrogen were used in a study of the kinetics and mechanism of thermooxidative destruction of cellulose nitroethers in the 393-423 K range. Structural changes in the nitroethers were heated and monitored by infra-red spectroscopy and viscosimetry. Change of physico-mechanical characteristics of the nitroethers, as a function of the temperature and duration of heating, correlates with the change of viscosity characteristics. The rate of decomposition of nitrogroups in position C<sub>6</sub> is about four times higher than that in positions C<sub>2</sub> and C<sub>3</sub>. Products of thermal destruction of the cellulose nitroethers include nitrogen oxides, CO, CO<sub>2</sub>, H<sub>2</sub>CO and others. Gaseous products diffuse from the polymer matrix, reducing the concentration of carbonyl groups, registered by infra-red spectroscopy in the solid sample. Figures 4; references 8 (Russian).

2791/12947  
CSO: 1841/513

UDC 542.91:541.515:547.1'127:547.1'118:547.567

INTERACTION OF BORON-CENTERED CARBORANE RADICALS WITH PHOSPHITES AND  
ADDITION OF CARBORANE-CONTAINING AND SOME OTHER PHOSPHORANYL RADICALS TO  
3,6-DI-TERT-BUTYL-ORTHO-BENZOQUINONE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2,  
Feb 86 (manuscript received 17 Apr 85) pp 458-461

[Article by B. L. Tumanskiy, V. Ts. Kampel, V. I. Bregadze, N. N. Bubnov,  
S. P. Solodovnikov, A. I. Prokofyev, E. S. Kozlov, N. N. Godovikov and  
M. I. Kabachnik, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov,  
USSR Academy of Sciences, Moscow]

[Abstract] Preparative photolysis of bis(m-carborane-9-yl)Hg and bis  
(carborane-9-yl)Hg with trimethylphosphite at 80°C for 40 hrs with ultra-  
violet light formed dimethyl(m-carborane-9yl)phosphonate (yield 5%, m. p.  
99-100°C) and dimethyl(p-carborane-2-yl)phosphonate (yield 60%, m. p. 75-76°C),  
respectively. Bis(o-carborane-9-yl)Hg did not produce the o-isomer, but gave  
o-carborane and metallic Hg. The interaction of carboranyl boron-centered  
radicals with phosphites proceeds through the formation of the phosphoranyl  
radical. The addition of phosphoranyl radicals, derivatives of 2,6,7-tris  
(trichloromethyl)-3,5,8-trioxy-1,4-diphosphabicyclo(2.2.2)-octane, to  
3,6-di-tert-butyl-ortho-benzoquinone was disclosed. Tautomeric transitions  
of the phosphoranyl group between the 0 atmos of ortho-benzoquinone were  
observed on EPR spectra. Figures 2; references 8: 7 Russian, 1 Western.

12886/12947

CSO: 1841/524

UDC 548.737.+541.515

MOLECULAR STRUCTURE OF 2,6,7-TRIS(TRICHLOROMETHYL)-1,4-DI-PHOSPHA-3,5,8-TRIOXABICYCLO[2.2.2]OCTANE (I): ESR SPECTRA AND REACTIVITY OF PHOSPHORANYL DERIVATIVE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 2 Apr 85) pp 546-552

[Article by A. N. Chernega, B. L. Tumanskiy, M. Yu. Antipin, S. P. Solodovnikov, N. N. Bubnov, A. I. Prokofyev, Yu. T. Struchkov, E. S. Kozlov, I. Ye. Boldeskul and M. I. Kabachnik, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences]

[Abstract] Tabulated x-ray analytical data are provided for I, covering such parameters as valence angles, bond lengths, and torsion angles in the 6-membered rings, in an attempt to explain the relationship between stereochemical lability of phosphoranyl radicals and the rate of their decomposition. The phosphoranyl radicals were prepared by UV irradiation of a solution of I in methylene chloride and pentane containing di-tert-butyl peroxide. Irradiation resulted in the formation of  $\text{Me}_3\text{CO}^\bullet$  radicals from the butyl peroxide, which reacted with I to give the phosphoranyl radical. ESR studies on the latter showed it to possess a high degree of stereochemical rigidity and resistance to beta-decomposition. These phosphoranyl radicals were also found to react with substituted o-quinones by addition to multiple O-C bonds with formation of phenoxyl radicals. Figures 2; references 28: 16 Russian, 12 Western.

12172/12947  
CSO: 1841/533

UDC 541.67:547.26'118

ROTATIONAL ISOMERISM IN METHYL-SUBSTITUTED DIALKYL- AND DIARYLMETHYLPHOSPHINE OXIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 13 Aug 84) pp 567-576

[Article by I. I. Patsanovskiy, E. A. Ishmayeva, Ye. N. Sundukova, A. N. Yarkevich and Ye. N. Tsvetkov, Kazan State University imeni V. I. Ulyanov-Lenin; Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka]

[Abstract] Measurements of dipole moments, the electrooptical Kerr effect, and IR spectroscopy were employed in a study on rotational isomerism of methyl-substituted dialkyl- and diarylmethylphosphine oxides. The results indicated that transition from dialkyl- to alkylphenyl and to diaryl-derivatives is accompanied by a shift in the conformational equilibrium to the sterically more convenient *gt* form with *gauche* disposition of the P=O and C-O bonds. The spatial structure of the chloromethyl and ether oxides of phosphines appeared to follow common conformational principles, consisting of a mutual *gauche*- and *trans*-orientation of the P=O and C-O bonds. An increase in the bulk of the substituent group on the phosphorus atom resulted in a shift of the equilibrium to the *gauche*-form. However, a change in the bulk of the substituent (X) or in the polarity of the C-X bond in going from the chloromethyl (X = Cl) to ether (X = OR<sup>3</sup>) phosphine oxides had no effect on the conformation. Figures 3; references 26: 15 Russian, 11 Western.

12172/12947  
CSO: 1841/533

UDC 547.241+547.46'052

REACTION OF O,O'-DIALKYL(ARYL)DITHIOPHOSPHORIC ACIDS WITH POLYCYANIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 16 May 84) pp 577-583

[Article by O. Ye. Nasakin, Ye. G. Nikolayev, P. B. Terentyev, A. Kh. Bulay  
and B. A. Khaskin, Chuvash State University imeni I. N. Ulyanov]

[Abstract] IR and NMR studies were conducted on the products obtained by the reaction of O,O'-dialkyl(aryl)dithiophosphoric acids with tetracyanoethylene (I), I-oxide, 1,1,2,2-tetracyanoethane (II), and tetracyanoalkanes (III). Reaction of I and I-oxide with diisopropyldithiophosphoric acid led to the synthesis of bis(diisopropylthiophosphoryl)-disulfide and, in the case of the reaction with I, to the formation of II and 2-(O,O'-diisopropyldithiophosphoryl)-5-amino-3,4-dicyanopyrrole. Phosphorylated dienes were prepared by the reaction of II with dialkyldithiophosphoric acids. Reaction of O,O'-dialkyl(aryl)dithiophosphoric acids with III resulted in the synthesis of O,O'-dialkyl-(aryl)-5-oxo-2,3,3-tricyano-1-alkenyldithiophosphates.

References 11: 9 Russian, 2 Western.

12172/12947  
CSO: 1841/533

UDC 547.26'118

PHOSPHORYLATED NITROGENOUS HETEROCYCLIC COMPOUNDS. PART II. PREPARATION  
OF PHOSPHONOALKYLATED [ $^{32}\text{P}$ ]-1,3-DIAZOLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 3 Jun 85) pp 592-595

[Article by G. L. Matevosyan, A. M. Makarov, P. M. Zavlin, A. N. Dyumin and  
V. A. Smolin, Leningrad Agricultural Institute]

[Abstract] In order to study the distribution, transport, and metabolism of phosphorylated azoles in plant tissues,  $^{32}\text{P}$ -labeled analogs were prepared by conventional radio-chemical methods. The essential approach consisted of the reaction of di(beta-chloroethyl)vinyl[ $^{32}\text{P}$ ]phosphonate with the corresponding imidazoles and benzimidazoles in acetonitrile, with trace quantities of sodium methylate, at 80°C for 3 h. Radiochromatographic analysis confirmed the synthesis of di(beta-chloroethyl)-beta-(1-imidazolyl-ethyl)[ $^{32}\text{P}$ ]phosphonate, di(beta-chloroethyl)-beta-(1-benzimidazolylethyl)[ $^{32}\text{P}$ ]phosphonate, and di(beta-chloroethyl)-beta-(1-(2-benzylbenzimidazolyl)ethyl)[ $^{32}\text{P}$ ]phosphonate. Figures 2; references 7: 6 Russian, 1 Western.

12172/12947  
CSO: 1841/533

UDC 547.1.118

REACTION OF TRIETHYLTRITHIOPHOSPHITE WITH BENZALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 14 Mar 85) pp 709-710

[Article by V. A. Alfonsov, I. S. Nizamov, E. S. Batyyeva and A. N. Pudovik,  
Institute of Organic and Physical Chemistry imeni A. Ye. Arbusov, Kazan  
Branch, USSR Academy of Sciences]

[Abstract] Conventional spectroscopic methods were employed in following the reaction of triethyltrithiophosphite with benzaldehyde(I) at 125-130°C, which resulted in the synthesis of the addition product diethyldithio-alpha-ethylthiobenzyl phosphonate (II). An additional product isolated from the reaction mixture was the diethylmercaptal of I. Elevation of the reaction temperature to 190-200°C led to the formation of triethyltetrathiophosphate and ethylbenzyl sulfide. The compound II was also formed at room temperature if HCl was added to the reactants in a ratio of 1:1:1, indicating that its formation at 125-130°C was due to acid impurities in I and triethyltrithiophosphite. References 8: 5 Russian, 3 Western.

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CSO: 1841/533

UDC 547.26'118

REACTION OF MESITYL OXIDE WITH DIBUTYLPHOSPHINEOXIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 26 Jul 85) p 711

[Article by A. A. Sobanov, I. V. Bakhtiyarova, M. G. Zimin and A. N. Pudovik,  
Kazan State University imeni V. I. Ulyanov-Lenin]

[Abstract] Reaction of equimolar concentrations of mesityl oxide with dibutylphosphineoxide at room temperature in the absence of a catalyst led to addition products on the C=O group and the C=C bond, on the basis of <sup>31</sup>P NMR and IR data. Isolation of the former was unsuccessful, but the latter products was isolated and identified as 2-methyl-2-dibutylphosphineoxido-4-pentanone. References 2 (Russian).

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CSO: 1841/533

UDC 547.794.2'118

NOVEL IMIDOPHOSPHONATE-AMIDOPHOSPHITE REARRANGEMENT

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 15 Jul 85) p 712

[Article by S. A. Terentyeva, M. A. Pudovik and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] It has been observed that 2-methoxy-2-diethylaminomethyl-4,5-benzo-1,3,2-oxaza-2-phospholene, which exists in the form of dimers in the crystalline state and in solution, undergoes rearrangement on distillation to 2-methoxy-3-diethylaminomethyl-4,5-benzo-1,3,2-oxazaphospholane. The latter compound is the first reported representative of N-phosphorylated animals.

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CSO: 1841/533

UDC 547.26'118

ADDITION OF PHENYLISOCYANATE TO 2-PHENYL-1,3,2-OXAZAPHOSPHORINANE (II)

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 15 Jul 85) pp. 712-713

[Article by M. A. Pudovik, T. A. Mironova and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] IR and  $^{31}\text{P}$  NMR spectroscopies were used to demonstrate that dropwise addition of phenylisocyanate to II in anhydrous ether results in an exothermic reaction that yields 2-phenyl-3-phenylaminocarbonyl-1,3,2-oxazaphosphorinane. After several hours the product separates in the crystalline form.

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CSO: 1841/533

UDC 547.1'118

ALKYLATION OF TRIETHYLTRITHIOPHOSPHITE (I) PHOSPHORUS ATOM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 3, Mar 86  
(manuscript received 11 Jul 85) p 713

[Article by V. A. Alfonsov, G. U. Zamaletdinova, E. S. Batyyeva and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] Spectroscopic methods were used to monitor the reaction of methyl iodide with I at room temperature in sealed ampules. The reaction resulted in the formation of an Arbuzov product, diethylmethyltrithiophosphonate. With an initial reactant ratio of I to methyl iodide of 1:5 the reaction was completed in 12h, but with a 1:1 ratio the reaction was only ca. 50% complete in that time. References 3 (Russian).

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## PESTICIDES

UDC 543.544

### CONCENTRATION OF PESTICIDE TRACES ON MACRO-CROSS-LINKED CARBOCHAIN ADSORBENTS FOR THEIR DETERMINATION IN ENVIRONMENTAL SAMPLES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 10, Oct 85  
(manuscript received 7 Jun 84) pp 1876-1882

[Article by V. D. Chmil, T. N. Burushkina and V. K. Pogorelyy, All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, Kiev]

[Abstract] Methods for concentrating trace amount of chlorinated hydrocarbons, chlorophenoxyalkane carboxylic acid, 2,4-dichlorophenol and the organophosphorus pesticide Counter were developed using the large-pore styrene-divinylbenzene adsorbents Polysorb S 40/100 and S 60/100. Measurements of static adsorption from aqueous solutions established that Polysorb S 60/100 had a higher adsorption capacity than S 40/100, due to the greater surface area of the former. Charge-transfer complexes are the main type of associates between the adsorbent and the polychlorinated adsorbates. This is demonstrated by the small, concentration-dependent shifts in PMR spectrum observed when dibenzyl is mixed with DDE or DDT. One would thus predict preferential retention of compounds with electron-acceptor pi-type orbitals, such as aromatic compounds with electronegative substituents. In agreement with this hypothesis, aldrin, hexachlorocyclohexane, heptachlor, keltan, DDE, DDD, DDT, 2,4-D and 2,4,5-T pesticides were completely adsorbed from aqueous solutions containing 5.0-100.0 mcg. Acetone and mixtures of acetone with acetic acid or mixtures of acetonitrile with water were most effective in desorption, due to hydrogen bonding. The hydrogen-bonding mechanism is confirmed by comparison of the PMR spectra of DDE and DDT in cyclohexane with those in acetone plus dimethylsulfoxide. Polysorb S 60/100 was also used to concentrate 2,4-D, 2,4-DCP, DDE and Counter from air, at levels of 0.001, 3.65, 0.004 and 0.245 mg/m<sup>3</sup> respectively. Rapid methods for concentrating pesticides from water and air using Polysorb S 60/100 were developed. Use of the methods gives a 20- to 40-fold concentration of the pesticides. References 12: 10 Russian, 2 Western.

12126/12947

CSO: 1841/233

## PETROLEUM PROCESSING TECHNOLOGY

### SOVIET PETROCHEMICAL PLANNING MODERATED

Kuala Lumpur BUSINESS TIMES in English 22 Jan 86 p 3

[Reuter Source, from Moscow 21 Jan 86: "USSR scales down petrochemical plans: Diplomats"]

[Text] The Soviet Union has scaled down plans to build four new petrochemical plants to concentrate on re-equipping existing enterprises, Western diplomats said yesterday.

The diplomats, who specialize in commercial affairs, said no formal announcement had been made, but "the general understanding" was that one plan had been cancelled and one shelved. This left two, including a major project for which international bidders still hoped to win contracts.

Since he came to power last March, Soviet leader Mikhail Gorbachev has made clear that the economic revival he seeks must be achieved by making better use of existing resources rather than by investing in grandiose new schemes.

The diplomats said the project cancelled was for a polyvinyl plant on Lake Baikal in Siberia. A scheme to build a nylon plant at Kursk had been shelved but might be revived on the current five-year plan running from 1986-1990, they said.

The Soviet Union still plans to build a polyolefin factory in the northern Caucasus and a big polyester plant at Ufa in the Ural Mountains.

The diplomats said Western firms, including Kobe Steel of Japan, ICL and John Brown of Britain, and UHDE of West Germany were negotiating for contracts, estimated to be worth between US\$1.5 and US\$4.4 billion, for the Ufa project.

One Western commercial attache said Mr Gorbachev's policy of improving rather than building afresh did not necessarily mean reduced opportunities for Western construction firms.

"Smaller, manageable projects can be just as lucrative and they are more certain," he said.

The Soviet Union produced over 1.4 million tons of chemical fibers in 1985, compared with 1.18 million in 1980. Under the current five-year plan, production is set to rise to 1.85 million tons by 1990.

The building of the Ufa plant figures prominently in this plan but from available data, it seems Moscow does not count on starting construction in 1986.

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CSO: 1841/349

## MARCH 1986 CRUDE OIL PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Apr 86 p 3

[Article "LET US MAKE UP THE DEFICIT" attributed to Heavy Industry Section, "S 1"]

[Text] The March crude-oil production figures give hope that the production lag can and should be overcome in the near future. Although, as before, the production deficit is still great--2.8 million metric tons--and the average daily production is more than 24,000 tons short of the plan, there are reasons to speak of changes for the better.

Compared to December, the daily crude-oil production has risen by 36,500 tons. During the first quarter of this year the associations of the ministry gave the nation 650,000 tons more crude oil and gas condensate than during the same period last year.

The petroleum production figures of the leading enterprises of the Petroleum Ministry are given below in percent of the March plan.

GLAVTYUMENNEFTEGAZ	97.0
"Nizhnevartovskneftegaz"	97.6
"Yuganskneftegaz"	100.5
"Surgutneftegaz"	100.6
"Noyabrskneftegas"	81.8
"Krasnoleninskneftegaz"	100.7
"Varyeganneftegaz"	89.8
"TATNEFT"	98.7
"BASHNEFT"	100.4
"KOMINEFT"	103.9
"MANGYSHLAKNEFT"	100.5
"KUYBYSHEVNEFT"	100.4
"TOMSKNEFT"	102.5
"PERMNEFT"	100.4
"UDMURTNEFT"	100.7
"ORENBURGNEFT"	100.7
"GROZNEFT"	101.0
"TURKMENNEFT"	103.8
"UKRNEFT"	100.8

The Komi Republic oilmen again distinguished themselves in the first month of spring. They exceeded the plan by about 60,000 tons of crude in March and by more than 100,000 tons in the first quarter. The achievements of the oilmen of Turkmenia, Mangyshlak, and a number of other traditional oil-producing regions make us happy. The production lag of the "Tomskneft" collective has been overcome. There, the conversion of the wells to mechanized production has been accelerated recently. The increased production rate will enable the Tomsk oilmen to fully eliminate their arrears already in April.

Good news arrived from Tyumen in the middle of March: the Country's main oil field is again producing at the rate of a million tons a day. Here the assistance to the Siberians with manpower, technology, and equipment, as well as the increased attention to the region by the party and economic agencies, certainly did the job. Changes in the Glavtyumenneftgaz [Main Administration of Tyumen Oil and Gas] departments have begun to bear fruit: organization of production has been improved, labor and technology discipline has been strengthened, and pressure to accomplish the assigned task has been intensified. Five new oil fields were opened in the Tyumen Oblast since the beginning of the year. All this has made it possible to halt the production slide and to increase significantly the daily output.

Three of the six Tyumen associations fulfilled the quarterly plan and produced additionally more than 150,000 tons of crude.

The Nizhnevartovsk oilmen show a clear improvement, even though it is not as rapid as desired. The production here increased by 20,000 tons since the beginning of the year. This is the biggest increase [po glavku--sic]. In March, 147 new wells were placed in operation and 90 were converted to mechanized production. The "Megionneft", "Novomolodezhinskneft", and "Belozerneft" oil- and gas-producing administrations of this large association attained the planned production level.

But, in spite of all the positive changes, the situation in Western Siberia does not put one's mind to rest. The Glavtyumenneftgaz enterprises failed to fulfill the March plan by 80,000 tons and the quarterly plan by more than 3 million tons.

One of the main reasons for the failure is serious deficiencies in the organization of routine and capital maintenance of the wells. Many "flying" maintenance brigades dispatched by other oil regions of the country to help the Tyumen oilmen are frequently idle, and their productivity and quality of work are below expectations. As a result, the number of Siberian oil wells producing above the norm is gradually declining. Their present number is about 1,500. This is the actual reserve that it capable of significant oil production increase.

As previously, there are great losses in this region due to unreliable electric power supply to the oil fields. A power outage occurred on March 21st along the 110-kV Kholmogory-Pulyakh power transmission line. The power supply to the Sutorminsk field was interrupted for more than two hours. Another outage occurred along this line the following day. Again hundreds

of wells went dead, the pumping of water to the oil strata was interrupted, and reservoirs and water pipes froze up. Direct oil losses at the "Noyabrskneftegaz" association alone amounted to nearly 3,000 tons.

Many petroleum collectives have revised their obligations and set higher goals in response to the 27th party congress decisions. Currently an important task for the industry workers and their subcontractors is to more fully utilize all possibilities of speeding up the attainment of the new goals.

12973/12947  
CSO: 1841/529

# MACHINE PRODUCTION PLAN EXCEEDED BY LEBEDYAN PLANT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Apr 86 p 3

[Article by Special Correspondent N. Klimov: "PRODUCTION ABOVE PLAN"]

[Text] The Lebedyan machine-building plant collective has had a quick start fulfilling the decisions of the 27th CPSU Congress. During the first year of the Five-Year Plan it will deliver 3,800 crude-oil submersible installation to the nation's oil fields.

This is a taxing task. But in spite of this the collective has given enthusiastic support to the initiative of the Moscow "Borets" Production Association to shift the delivery schedule to the first quarter. The promise has been kept. Having fulfilled the quarterly quota, the Lebedyan machine builders delivered to the Tyumen oilmen 70 additional crude-oil pumps and produced spare parts for them valued at 40,000 rubles. The brigades headed by M. Kuznetsov, A. Ukolov, and A. Fomin made important contributions to the production speed-up.

Lebedyan, Lipetskaya Oblast

12973/12947

CSO: 1841/529

## BRIEFS

METHANE FOUND IN ANTARCTIC ROCKS--Recently researchers from the All-Union Scientific-Research Geological Survey Institute (Leningrad) discovered methane and other hydrocarbons in the rocks of Antarctica. Scientists believe that this finding proves once more that organic compounds, for example hydrocarbon gases, can be formed not only in the sedimentary rocks of the earth's crust, but also in its depths. Of course the quantity of these gases is small, but nevertheless it has been possible to establish their chemical composition. Along with nitrogen and carbon dioxide, the tiny pores of the rocks contain up to 83 percent methane. Other hydrocarbons have also been found--ethane, butane, and propane gases. The ratio between methane and its nearest chemical "relatives" is very close to that usually observed for deposits of natural gas. How did hydrocarbons appear in the rocks of the depths? Researchers are proposing one of the possible explanations: the hydrocarbons might be formed directly by inorganic synthesis. [Text] [Moscow ZNANIYE-SILA in Russian No 12, Dec 85 p 23] [COPYRIGHT: Znaniye-sila", 1985] 12255/12947

CSO: 1841/431

UDC 621.892.092:541.128

METHOD OF ASSESSING LIKELIHOOD OF COMPRESSOR OILS FOR SELF-IGNITION IN  
SUPER-CHARGER SYSTEMS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86 pp 36-38

[Article by Yu. L. Smertyak, Ye. V. Lukashchenko and A. S. Belous, All-Union  
Scientific Research Institute of Compressor Machines]

[Abstract] Inclination of compressor oils to self-ignition in super-charging systems was studied with the use of a device developed for this study. A diagram of the device is presented and the process is described step by step. Tendency of oils to self-ignition was assessed by the mean duration of the period from beginning of the experiment up to ignition of oil under conditions of the experiment or until the end of the experiment (360 minutes). A tabulation of qualities of foreign and Soviet oils studied is presented and the data are discussed. Use of the device makes it possible to classify oils by their inclination to self-ignition in high pressure systems, especially thermally stressed air compressors. Figure 1; references 4 (Russian).

2791/12947  
CSO: 1841/522

UDC 621.892.097:665.582.66.022

# INCREASING HYDROLYTIC STABILITY OF SYNTHETIC OILS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86 pp 22-23

[Article by A. I. Yechin, G. T. Novosartov and T. B. Kondratyeva]

[Abstract] A study of hydrolytic stability of oils based on esters involved keeping a pre-homogenized mixture of oil with 25 percent water at 100°C for 24 hours and assessment of the degree of hydrolysis by the change of acid number of the oil and the pH and acid number of the water. The tests showed that pentaerythritol ether (PEE) without additives is practically unhydrolyzed but the presence of tricresyl-phosphate (TKP) increases the degree of hydrolysis significantly with formation of acidic products, including water-soluble acids. Intensity of hydrolysis is directly proportional to TKP concentration. Soval (diphenyl chloride) had the highest catalytic activity of the other additives studied while 2-mercapto benzothiazol (captax) does not cause hydrolysis of PEE. Addition of aromatic amines anti-oxidation additives does not decrease the effect of TKP. It was found that a necessary and sufficient condition for hydrolysis of the additives (DOS and PEE) is the simultaneous presence in them of water and additives which catalyze hydrolysis of the esters. Presence of secondary aliphatic amines increases hydrolytic stability of oils based on DOS and PEE without worsening other operational parameters and also reduces the tendency of oil based on PEE to form high-temperature deposits. Figure 1; references 4: 3 Russian, 1 Western.

2791/12947

CSO: 1841/522

UDC 665.765-404"71"

ROLE OF OXYGEN-CONTAINING SURFACTANTS DURING STORAGE AND USE OF INDUSTRIAL OILS AND COMPOSITIONS OF ADDITIVES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 3, Mar 86 pp 20-22

[Article by I. G. Fuks, S. B. Shibryayev, A. A. Chesnokov and B. P. Tumanyan, Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin]

[Abstract] Interaction of oxygen-containing surfactants with additives and compositions of them introduced into IGNSp-38 d commercial oil was studied in order to determine the prospects of increasing the colloidal stability of oils and the effectiveness of the additives. Chemically-pure lauric acid and lauric alcohol were added to the oil to model the effect of oxygen-containing surfactants forming during oxidation of hydrocarbons of the dispersion medium. The tendency of molecules of the additives to form micelles with the oxygen-containing surfactants is one of the main factors affecting the colloidal stability and operational properties of the oils studied. The effect of oxygen-containing surfactants on the colloidal stability of the additives lessens upon increase of polarity of the dispersion medium or products of oxidation. Use of corrosion inhibitor "A" instead of B-15/41 in IGSp-38 d oil, because of the interaction of the additive with the oxygen-containing surfactants, has a multifunctional effect. The oil with the new composition of additives is more resistant to the effects of products of oxidation and water, has higher colloidal stability and the best filterability and lubricating quality. Figure 1; references 4 (Russian).

2791/12947

CSO: 1841/522

## INDUSTRIAL PLANT EXPANDING

Vilnius SOVETSKAYA LITVA in Russian 4 Feb 86 p 1

[Article by Ya. Rivkin, Chief Project Engineer, "Orgtekhstroy" Trust]

[Abstract] A new section is planned for processing of petroleum at the Mazheykskiy Petroleum Refinery, to accept, as input, fuel oil produced in two other sections at the same refinery and to produce nonethylated type AI-93 gasoline. In addition to the main fuel oil processing section, other large and complex structures will be constructed: installations for production of hydrogen, chemical water processing, production of elementary sulfur, reagents and other products. During the first six months of this year, the site is to be prepared for installation of the technological equipment. Over 100,000 cubic meters of concrete will be required by the project, indicating the need for a mechanized concrete plant to be constructed at the refinery.

6508/12947

CSO: 1841/387

UDC 543.75:548.33:532.77

OPTICAL METHOD FOR MONITORING QUALITY OF PHARMACEUTICALS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 10, Oct 85  
(manuscript received 11 Nov 84) pp 1895-1898

[Article by N. B. Leonidov and S. I. Uspenskaya, Moscow State University imeni  
M. V. Lomonsov; All-Union Scientific Research Institute of Pharmacy, Moscow]

[Abstract] Due to the importance of phase analysis in pharmaceutical quality control, a study was conducted on the refractometric analysis of eight medicinal compounds, using total internal reflectance. Differences of 0.0004 to 0.0010 were found in the refractive indices of the two polymorphic forms of streptocide, sulfadimez ine, caffeine, codeine, homatropine hydrobromide, barbital, hydrocortisone and l-comphor. Measurements were conducted in solution, with dimethylformamide, chloroform or ethanol as the solvent. The results indicate that accurate measurement of refractive index can be used to reveal bioinequivalence. Studies on the effects of water-ethanol mixtures and the presence of potassium bichromate indicate that impurities at levels below 1% and solution color do not affect method accuracy. References 17: 12 Russian, 1 Hungarian, 1 Polish, 3 Western.

12126/12947  
CSO: 1841/233

PREPARATION OF HYDROXYALKYLENE METHACRYLATES

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 2, Mar-Apr 86 (manuscript received 11 Mar 85) pp 25-28

[Article by N. G. Ugro, S. S. Gudzera, P. M. Daviskiba and V. K. Grishchenko, Institute of Chemistry of Macromolecular Compounds, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A simplified method was devised for the synthesis of hydroxyalkylene methacrylates that carried less risk of an explosion. The reaction was carried out in a cooled stainless steel reactor under normal pressure with intensive mixing, using either triethanolamine, triethylamine, or 2,2,6,6-tetramethyl-4-oxo-piperidine-1-oxyl as the catalyst, and either hydroquinone or benzoquinone for inhibition of radical polymerization. Following charging with methacrylic acid, the catalyst and the inhibitor, the temperature was adjusted to 363-393 K, and 1,2-alkylene oxide was added over a 2-3 h period, to give an acid:oxide ratio of 1:(1.1-1.5). With an additional 0.5-1 h of stirring after addition of all the oxide, the degree of acid conversion was on the order of 95-98%. Diisocyanates and hydroxylalkylene methacrylates were pretreated with alkyl halides (Br or I) to minimize exothermic effects. References 5 (Russian).

12172/12947  
CSO: 1841/535

UDC 678.01.53.742

EFFECTS OF COMPOSITION OF HEAT CROSS-LINKED POLYETHYLENE PRODUCTS ON THEIR PROPERTIES

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 2, Mar-Apr 86 (manuscript received 5 Dec 84) pp 31-34

[Article by V. I. Myshko and A. A. Kachan, Division of Petrochemistry, Institute of Physical Organic Chemistry and Coal Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the composition of the various components that enter into the production of polyethylene products that are suitable for use as piping in the oil and gas industry, in relation to their effects on properties of such materials following thermal cross-linking. Specifically, studies with high-density polyethylene and the ratios of the peroxide, accelerator and antioxidant, as well as invariable concentrations of carbon black, thermostabilizers, regulators and softeners were assessed in relation to cross-linking temperatures. Optimal temperature range for the production of products with maximal gel-fractions of ca. 70% was found to cover the 473-523 K interval, requiring only 10-20 min for cross-linking. Heating temperatures above 523 K are to be avoided as thermal destruction exceeds cross-linking. Within limits, variation of the various components can be manipulated to attain polyethylene products with desired characteristics when heating is employed for cross-linking. Figures 2; references 10: 9 Russian, 1 Western.

12172/12947  
CSO: 1841/535

UDC 535.371

1,3,2-DIOXABORINE DERIVATIVES--FLUORESCENT ACRYLIC MONOMER BLOCK  
POLYMERIZATION INDICATORS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 29, No 12, Dec 85  
(manuscript received 8 Feb 85) pp 1111-1113

[Article by N. N. Vasilyev, A. Ya. Gorelenko, I. I. Kalosha, V. A. Tolkachev  
corresponding member of the BSSR Academy of Sciences, and A. D. Shkadarevich,  
Institute of Physics, BSSR Academy of Sciences]

[Abstract] A study is reported of the fluorescent properties of two 1,3,2-dioxaborines in the process of block polymerization of their solutions in acrylic monomers. Polymerization was performed in a thermostated glass cuvette with azoisobutyronitrile initiator. The degree of conversion of the monomer to the polymer was determined gravimetrically. A sharp increase in the intensity of fluorescence in the polymer was observed as polymer conversion reached 60%, changing the color of specimens and allowing it to be used to monitor the process of formation of polymer elements during block polymerization. 1,3,2-Dioxaborine derivatives can thus serve as convenient fluorescent indicators of the formation of a solid polymer phase in the process of polymerization of acrylic monomers. Figures 2; references 10: 4 Russian, 6 Western.

6508/12947  
CSO: 1841/375

UDC 614.841.4:678.1

# CARBONIZING ADDITIVES AS FIRE RETARDANTS IN POLYMERS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 2, Mar-Apr 86 (manuscript received 15 Dec 83) pp 73-77

[Article by K. M. Gibov, I. I. Nikitina and S. A. Galymzhanov, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma Ata]

[Abstract] Studies were conducted on the combustion products of phenol-formaldehyde resin SF-0119 with selected carbonizing additives to determine those which would be effective as fire retardants. The combustion studies, conducted over a temperature range of 100 to 800 °C at a rate of 100°C/min, with chromatographic and IR and <sup>13</sup>C NMR analyses of the products demonstrated that selected agents enhanced either the dehydration or dehydrogenation processes in phenol-formaldehyde resin combustion. Agents such as platinum black, Raney nickel, sulfur and nickel polychelate, which promoted dehydrogenation, did not enhance resistance to flammability. However, phosphoric acids and their salts and boric oxide diminished flammability and increased coking as a result of dehydration. Figures 3; references 5: 3 Russian, 2 Western.

12172/12947  
CSO: 1841/534

UDC 541.64:541.13

FILM FORMATION IN ELECTROCHEMICAL INITIATION OF POLYMERIZATION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 2, Feb 86  
(manuscript received 10 Oct 84) pp 369-374

[Article by Ya. D. Zytner, N. K. Zabrodina, O. K. Lebedkina, L. N. Mashlyakovskiy and K. A. Makarov, First Leningrad Medical Institute imeni I. P. Pavlov; Leningrad Technologic Institute imeni Lensovet]

[Abstract] To date, few studies have been devoted to the mechanism of polymer film formation on an electrode surface during electrochemical initiation of polymerization. In view of this, a brief review is presented of the information that has been accumulated for some systems, concentrating on the various physicochemical phenomena that are involved. Phase diagrams are used to delineate the polymer concentration in the boundary layer at which a single-phase solution undergoes a transition into a two-phase system or loses its fluidity, which results in termination of the induction period and deposition of the polymer on the electrode surface, followed by increase in the thickness of the film. The increase in ohmic resistance imparted by the growing thickness of the polymer coating eventually leads to termination of electrochemically initiated polymerization. Graph depiction is provided of the morphological or structural characteristics of the films for several different polymer systems, and the factors that affect them. Figures 3; references 11: 8 Russian; 3 Western.

12172/12947  
CSO: 1840/525

UDC 678.674:54:36

CHEMICAL AND RADIATION STABILITY OF POLYETHYLENETEREPTHALATE-POLYACRYLIC  
ACID GRAFT CO-POLYMERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 2, Feb 86  
(manuscript received 21 Aug 84) pp 405-409

[Article by I. F. Osipenko, V. I. Martinovich and N. R. Prokppchuk, Institute  
of Physical Organic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] In view of the potential use of polyethyleneterephthalate-polyacrylic acid (PETP-PA) graft co-polymers as ion-exchange and adsorptive fibers and membranes, studies were conducted to evaluate their stability vis-a-vis acidity and irradiation. The PETP-PA samples were analyzed for equilibrium exchange volume (EEV), elasticity and strength before and after exposure to 1 to 35% HCl or 1 to 10% sulfuric acid for 200 to 400 h at 20°C, or exposure to gamma irradiation with a 0.1 to 1.6 MGy dose from a Co-60 source. The results demonstrated that PETP-PA fibers were stable to acid treatment, with reduction in EEV limited to about 5%. Some hydrolysis of the PETP component was noted and reflected in slight reduction in deformation-strength characteristics of the fibers, while the PA component was unaffected. A similar degree of reduction in EEV was seen with gamma irradiation at the higher doses, with retention of deformation-strength characteristics favored by high PA concentration (19-161%). These observations indicate that PETP-PA fibers can sustain acid regeneration when used as ion exchangers, and that resistance to physical deterioration is predicated on the energy of intermolecular interaction of the macrochains. References 10 (Russian).

12172/12947  
CSO: 1840/525

UDC 678.13-678.19

TRANSITION LAYER STRUCTURE IN CONTACT ZONE OF INCOMPATIBLE POLYMERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHNLOGIYA in Russian Vol 28, No 12, Dec 85 (manuscript received 26 Apr 84)  
pp 77-80

[Article by A. N. Kamenskiy, L. Kheksel, V. Ya. Kiselev and I. A. Tutorskiy,  
Department of Colloid Chemistry, Moscow Institute of Precision Chemical  
Technology imeni M. V. Lomonosov]

[Abstract] Polystyrene (PS) with molecular weight of 42,000 or 800,000 and polymethylmethacrylate (PMMA) with molecular weight of 25,000 or 727,000 were used to study the boundary region of the incompatible polymers. Ultra-thin sections of two-layer samples (dry or from a solution) of doubled polymers were studied under an electron microscope. There is a diffuse transition layer between the two-layer samples. The thickness of this layer, which depends upon the molecular weight of the polymers, the method and conditions of their doubling and the plasticizer level in them, is 80 nm. Heating the low-molecular-weight doubled polymers from a solution produced a heterogenic mixture of polymers. Doubling of high-molecular-weight polymers from a solution containing plasticizer produced a heterogenic mixture of polymers with or without heating. A heterogenic mixture of polymers forms by spontaneous emulsification of one polymer in the other. Figures 3; references 12: 9 Russian, 3 Western.

2791/12947

CSO: 1841/513

UDC 678.4.063

DIFFUSION IMPREGNATION OF RUBBER WITH FUNGICIDES TO PREVENT BIODEGRADATION

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 2, Mar-Apr 86 (manuscript received 24 Jul 85) pp 21-25

[Article by Ye. I. Gerashchenko and Ye. V. Prokazova, Dnepropetrovsk Branch, Scientific Research Institute of Rubber Industry]

[Abstract] A series of synthetic rubbers were subjected to impregnation by diffusion with either thiuram (tetramethylthiuram disulfide) or trilan (4,5,6-trichlorobenzoxazoline-2) at 120°C, to determine whether diffusion permeation of the vulcanizates would impart resistance to biodegradation. The rate of saturation of the elastomers was found to depend on their polarity, with the following ranking for both fungicides: SKN-26 > (CKN-18 + SKN-26) > SKN-18 > (SKN-18 + Nairit) > SKEP > SKT > SKF-32. The treated samples contained 0.24-2.46% of the fungicide. These levels were sufficient to prevent deterioration due to aging and inhibited surface mold growth. The advantage of diffusion treatment of elastomers is that it avoids changes in formulations and does not affect the basic physical and mechanical characteristics for which these elastomers were designed. Figures 5; references 6 (Russian).

12172/12947

CSO: 1841/535

## WOOD CHEMISTRY

### TOMSK CHEMICAL FACILITY COMPLETED

Moscow IZVESTIYA in Russian 24 Feb 86 p 1

[Article by L. Aleynik: "Handed Over 'Turn Key'"]

[Text] The State Commission has signed an act to turn over a new production complex at Tomsk Chemical Plant for operation. As correspondent A. Aleynik reports from the press center of the Ministry of Installation and Special Construction Work, production has begun for carbamide resins which are necessary to manufacture wood particle boards, furniture and fabric.

"About 200,000 tons of these 'universal' resins will be produced each year," said G. Belyak, chief engineer of the plant. "Chemists have had to assimilate the new capacity at a rate faster than the normative."

The startup of the complex for producing carbamide resins is the result of selfless labor by collectives of the Khimstroy General Contracting Administration and subdivisions of the USSR Ministry of Installation and Special Construction Work, which were able to eliminate the difficulties and do the job properly.

Envoys from many krais and oblasts came to an all-union shock working session to help the Tomsk builders and assemblers. Brigades of cadre specialists came from Krasnoyarsk, Norilsk, Yakutsk, Moscow, and Leningrad. They had to lay more than 100 kilometers of pipes and assemble about 700 units of large technological equipment.

Without losing a single day to get started, the visitors immediately threw themselves into the heated competition. They set up a sort of conveyor belt in the area: each object was collected, tested, and handed over completely ready, "turn key," to machine setters. The brigades of I. Peremitin, A. Titarchuk, N. Naumov, and other leading collectives conducted the equipment installation "on a roll."

As the finish came closer and closer, the tempo became more and more accelerated. The electricians' brigade of V. Akamov, construction veteran of all production facilities of Tomsk Chemical Plant, from the Spetsmontavtomatika Trust, labored confidently. They activated control panels throughout the entire network of production, and efficiently and precisely assembled a rapid-operating computer for automatic control of production processes.

Finally, the moment came when it was known: carbamide resins are being produced in a continuous technological system!

12255/12947  
CSO: 1841/431

## PROPOSALS FOR DEVELOPMENT OF SIBERIAN FOREST INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Apr 86 p 2

[Article, "Forest Potential of Siberia"]

[Text] An article by Academician A. Isayev, under the above title, was published in our newspaper on 12 September 1985. The USSR Ministry of Forest, Cellulose and Paper, and Wood Processing Industry has examined the article and has noted the relevance and significance for the national economy of the questions raised in it--elimination of lumbering by lumber users, implementation of nature conservation measures in construction of hydroelectric power plants, development of intensive chemical and chemical-mechanical treatment of wood, and modernization and re-equipment of existing enterprises. This has been communicated to the editorial staff by Deputy Minister G. Medvedev.

The ministry has prepared proposals for concentrating timber preparation and hauling by 1990 in the enterprises and associations of the USSR Minlesbumprom [Ministry of Forest and Paper Industry]. Thus, it is proposed to transfer the lumbering enterprises of other ministries and departments to the USSR Minlesbumprom. These enterprises produce annually 7.9 million cubic meters of timber.

The water reservoir beds are prepared for construction of hydroelectric power plants according to technical standards developed by the Gidroyekt Institute of the USSR Minenergo [Energy Equipment Ministry]. Currently, Giprolestrans [State Institute for Design of Forest Industry Transportation Equipment] has prepared proposals for reviewing the existing standards for the removal of timber [lesosvodka] and forest clearing in the flood zones of the water reservoirs. The ministry is of the opinion that the construction of water engineering systems should be coordinated to conform to the schedule approved by the USSR Gosplan, according to which main roads to the hydroelectric power plant site are built, power transmission lines are laid, and the first stages of enterprises for processing the removed timber are constructed prior to the construction of the main structures. Minlesbumprom has submitted these proposals for approval by the USSR Gosstroy [State Committee of USSR Council of Ministers for Construction].

The ministry's design institutes have prepared a plan for the development of the industry up to the year 2000. This plan includes measures for

construction and expansion of lumbering and wood processing enterprises in Siberia and the Far East. This will significantly improve the utilization of forest resources in this region.

The editorial staff has also received a reply from the deputy chairman of the USSR State Committee for Forestry Yu. Yagodnikov. He informed us that the committee is implementing measures aimed at strengthening government supervision of the established schedule of utilization of the forests by all users. Frequent checks are made each year, measures aimed at elimination of infractions are implemented, and officials responsible for infractions are brought to account. Also, the scientific organizations have been requested to continue the development of economic measures of stimulating optimal utilization of natural resources.

12973/12947  
CSO: 1841/529

## BRATSK PLYWOOD PRODUCTION BEHIND SCHEDULE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Apr 86 p 3

[Article: "Naming the Laggards, Bratsk Plywood Plant"]

[Text] The attainment of the design capacity of this large plywood-industry enterprise is clearly lagging. Therefore, the year's production quota was established below the design capacity of the plant. But the collective is not keeping up even with this lower quota. It produced during three months only 91.9 percent of the planned amount of plywood.

The Bratsk workers can not blame poor equipment, which is first class in all departments. This makes the stoppages due to raw materials shortages even more intolerable. Unfortunately, the managers of the Bratsk forest-products complex (B. Chuyko, general manager), which includes the plywood plant, frequently solve the problems of ensuring the cellulose production at the expense of the plywood producers. The raw materials for plywood production is comminuted to chips, while they themselves get the material most suitable for the sawmill. As a result, the equipment productivity falls, and waste piles are growing. This year the situation became more complicated by the wear of the dryer screens. The LPK [Forest Products Cooperative] was unable to organize their timely replacement. Under these conditions it was very important to arrange for mass repair of the screens at the plant itself, but this proceeded slowly, which directly affected the operating results of the plant departments. In summary, having fulfilled its export obligations, the Bratsk plywood plant has remained in arrears to many domestic consumers.

12973/12947  
CSO: 1841/529

## USSR FOREST RESOURCES AND PRODUCTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Apr 86 p 2

[Article from TASS, "FOREST -- A NATIONAL RESOURCE", Report from USSR Supreme Soviet Standing Commissions]

[Text] A joint session of industry commissions and commissions on protection of nature and efficient utilization of natural resources of the USSR Supreme Soviet Union Council and Nationalities Council was held in the Kremlin on April 9th. The session dealt with the question of adherence of the USSR Ministry for Forests, Cellulose and Paper, and Wood Processing Industry to the requirements of the legislation concerning the efficient utilization of forest raw material resources.

The report of the USSR minister M. I. Busygin, the supplementary report of the chairman of the deputies preparatory [podgotovitelnyy] commission Academician A. S. Isaev, and deputies' speeches noted that, guided by the Communist Party and by the requirements of the USSR legislature, the ministry and its subordinate associations, enterprises, and organizations have made concrete efforts in recent years to improve the utilization of wood raw materials. The industry has been implementing the experience of collectives such as "Yugmebel", "Tsentronebel", and the "Kievdrv" production association, which has been approved by the CPSU Central Committee.

Also, it was emphasized at the meeting that the work of the ministry and its sections still does not fulfill the tasks mandated by the 27th CPSU Congress and the legislative requirements. Mismanagement is tolerated, the forest raw materials are not utilized efficiently, and production plans for the more important products are not fulfilled.

Minlesbumprom [Ministry of Forest and Paper Industry], other ministries and departments, and the Councils of Ministers of the Union Republics were asked to examine the recommendations and remarks presented in the commissions' documents and to report to the commissions by August 1, 1987 on the measures adopted by them.

It was also decided to request the USSR Supreme Soviet Presidium to recommend to the Union Republics Supreme Soviets that they implement measures aimed at a more thorough enforcement, by the local councils of national deputies,

of the laws available to them in the area of government management and control of the utilization of forest resources.

Deputy Chairman of the USSR Supreme Soviet Presidium R.B.I. Songayla,  
Chairman of the Union Council of the USSR Supreme Soviet L.N. Tolkunov,  
Secretary of the Presidium of the USSR Supreme Soviet T.N. Menteshashvili,  
and heads of a number of ministries and departments participated in the work of the session.

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CSO: 1841/529

## MISCELLANEOUS

### WAVE PROCESSES IN CHEMICAL PHYSICS

Moscow VOLNOVYYE PROTSESSY V KHIMICHESKOY FIZIKE (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA "KHIMIYA") in Russian No 1, Jan 86 p 2, 32

[Annotation and table of contents from monograph by B. V. Novozhilov:  
"Volnovyye protsessy v khimicheskoy fizike (Novoye v zhizni, nauke, tekhnike: Seriya 'Khimiya') [Wave Processes in Chemical Physics (New Developments in Life, Science, Technology: Chemistry Series)], Moscow, Znaniye, 1986, 32 pp, 27,490 copies]

#### [Text] Annotation

The intensification of industrial production in our time would be unthinkable without rapid use of the advances of science. Based on two examples (frontal polymerization and heterogeneous catalysis), the author shows that the extensive scientific developments connected with wave processes in active environments have practical applications. The brochure discusses the possibility of frontal spreading of chemical conversion in space and tells about the fundamentally new effects (self-excited oscillations, combustion spin) discovered in recent years.

The brochure is intended for lecturers, instructors, and students of peoples universities.

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